

**U.S. DEPARTMENT OF COMMERCE
National Technical Information Service**

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**Research, Demonstration, Training, and
Fellowship Awards Listing Awards
During October 1977-March 1978**

(U.S.) Environmental Protection Agency, Washington, DC

1978

United States
Environmental Protection
Agency

Grants Administration
Division (PM-216)
Washington DC 20460

EPA-GAD-1-78-03
October-March FY 1978

PB 289857

EPA

Research, Demonstration, Training, and Fellowship Awards

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9. Performing Organization Name and Address Grants Administration Division Office of Resources Management Office of Planning & Management Environmental Protection Agency			10. Project/Task/Work Unit No. 11. Contract/Grant No.																
12. Sponsoring Organization Name and Address Same as Item 9			13. Type of Report & Period Covered 1st Half FY 1978 14.																
15. Supplementary Notes This is an addition to the series of Awards Registers																			
16. Abstracts This publication lists the grant awards offered by EPA during the period of October 1977 - March 1978, Fiscal Year 1978, for research, demonstration, training, and fellowship programs. A brief project description for most of the research and demonstration grants administered by Headquarters is contained in Section Two, arranged in ascending order of the Grant Identification Number. A Grant Number Index is included to assist cross-referencing into Section One material.																			
17. Key Words and Document Analysis. 17a. Descriptors <table border="0"> <tr> <td>Water</td> <td>Pesticides</td> <td>Fellowships</td> </tr> <tr> <td>Awards</td> <td>Grants</td> <td></td> </tr> <tr> <td>Air</td> <td>Radiation</td> <td></td> </tr> <tr> <td>Solid Waste</td> <td>Water Supply</td> <td></td> </tr> <tr> <td>Hazardous Materials</td> <td>Training</td> <td></td> </tr> </table> 17b. Identifiers/Open-Ended Terms EPA Awards for research, demonstration, training, & fellowship programs 17c. COSATI Field/Group					Water	Pesticides	Fellowships	Awards	Grants		Air	Radiation		Solid Waste	Water Supply		Hazardous Materials	Training	
Water	Pesticides	Fellowships																	
Awards	Grants																		
Air	Radiation																		
Solid Waste	Water Supply																		
Hazardous Materials	Training																		
18. Availability Statement Release unlimited		19. Security Class (This Report) UNCLASSIFIED 20. Security Class (This Page) UNCLASSIFIED	21. No. of Pages 22. Price																

INTRODUCTION

This publication provides information about the Environmental Protection Agency's (EPA) research, demonstration, training, and fellowship awards during the period October 1977 - March 1978. It is a companion publication to State and Local Grant Awards which lists awards to State and Local agencies.

The data is organized into two sections:

Section One - Geographic listing by State and program.

Section Two - Grant Number Index and brief project descriptions arranged in ascending order of the Grant Identification Number.

Project descriptions were, for the most part, prepared by the grantees and are provided only for those grants administered by the EPA Headquarters office. The inclusion of this information has proven to be very useful from a management aspect as well as in meeting and fulfilling requirements for providing information to the public.

The Grant Number Index is provided as an aid for cross-referencing information between the two sections. Locating a grant number in this index, the reader will find the name of the applicant and the State location. By referring to that State's listing(s) in Section One, information on that particular grant will be found.

Any comments or criticisms should be directed to Lynn Szedon, Grants Operations Branch (PM-216), Grants Administration Division, on (202) 755-3370.

SOURCES OF INFORMATION ON EPA GRANTS AWARDED, REPORTS
GENERATED BY GRANTS AND OTHER GRANT-RELATED MATERIALS

Research, Demonstration, Training, and Fellowship Awards

Section I lists research, demonstration, training, and fellowship awards by State, program, and grantee name. Each record provides applicant name, municipality, program element, title, project director, grant identification number, type of grant award, date and dollar amount of award. Section II contains brief project descriptions for research and demonstration projects administered by Headquarters and is arranged in ascending order by the grant identification number. An index is provided for cross-referencing the information between Sections I and II.

1st Half of FY 1977 (October 1976 - March 1977)
EPA-GAD/1-78-01, NTIS Number PB278942, price \$7.25

2nd Half of FY 1977 (April 1977 - September 1977)
EPA-GAD/1-78-02, NTIS Number PB283959, price \$21.50

State and Local Grant Awards

Lists all State and Local Assistance Awards by State, by program and by grantee name. Format the same as for Research, Demonstration, Training, and Fellowship Awards listed above.

1st Half of FY 1977 (October 1976 - March 1977)
EPA-GAD/2-78-01, NTIS Number PB279888, price \$11.75

2nd Half of FY 1977 (April 1977 - September 1977)
EPA-GAD/2-78-02, NTIS Number PB282687, price \$15.25

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA

Volume I. Section I lists research, demonstration, training and fellowship awards by State, program, and grantee name. Each record provides applicant name, municipality, program element, title, project director, Grant Identification Number, type of grant award, date and dollar amount of award. Section II contains brief project descriptions for research and demonstration projects administered by Headquarters and is arranged in ascending order by the Grant Identification Number. An index is provided for cross-referencing the information between Sections I and II. Section III is a cross-walk for use in identifying the program/subprogram area of a grant in accordance with classifications of our Office of Research and Development.

1st Half of FY 1976 (July 1975 - December 1975)
EPA-GAD/1-76-001, NTIS Number PB252893, price \$5.25

2nd Half of FY 1976 (January 1976 - June 1976)
EPA-GAD/1-76-003, NTIS Number PB260742, price \$9.00

Transition Quarter of FY 1976 (July 1976 - September 1976)
EPA-GAD/1-76-005, NTIS Number PB275407/AS, price \$8.00

1st Half of FY 1975 (July 1974 - December 1974)
EPA-GAD/1-75-001, NTIS Number PB241476, price \$5.25

2nd Half of FY 1975 (January 1975 - June 1975)
EPA-GAD/1-75-003, NTIS Number PB245575, price \$10.75,
Microfiche \$3.00

Volume II. Lists all State and Local Assistance Awards by State, by program, and by grantee name. Contents and format the same as for Volume I, Section I.

1st Half of FY 1976 (July 1975 - December 1975)
EPA-GAD/1-76-002, NTIS Number PB253091, price \$11.00

2nd Half of FY 1976 (January 1976 - June 1976)
EPA-GAD/1-76-004, NTIS Number PB261980, price \$11.00

Transition Quarter of FY 1976 (July 1976 - September 1976)
EPA-GAD/1-76-006, NTIS Number PB275408/AS, price \$9.00

AWARDS REGISTER, VOLUME II, CONTINUED

1st Half of FY 1975 (July 1974 - December 1974)
EPA-GAD/1-75-002, NTIS Number PB241400, price \$9.00
Microfiche, \$3.00

2nd Half of FY 1975 (January 1975 - June 1975)
EPA-GAD/1-75-004, NTIS Number PB245576, price \$11.75,
Microfiche, \$3.00

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA

Fiscal Year 1974 (July 1973 - June 1974)

Volume I. Lists all awards in Fiscal Year 1974 except Waste
Water Treatment Construction and Waste Water Treatment
Reimbursement Awards. NTIS Number PB238370, price
\$8.00, microfiche, \$3.00

Volume II. Lists only Waste Water Treatment Construction Awards
in Fiscal Year 1974. NTIS Number PB238371, price
\$9.25, microfiche, \$3.00

Volume III. Lists only Waste Water Treatment Reimbursement Awards
in Fiscal Year 1974. NTIS Number PB238372, price
\$9.00, microfiche, \$3.00

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA

Fiscal Year 1973 (July 1972 - June 1973)

The format of this publication has the initial sort
by State. Each entry includes grantee, identification
number, program area, grant title, award date, and
dollar amount. NTIS Number PB229827, price \$15.25,
microfiche, \$3.00

The above publications can be purchased from:

National Technical Information Service (NTIS)
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
(703) 557-4650

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA

Fiscal Year 1972 (July 1971 - June 1972)

This publication is currently out of print. It is available for reference at all EPA libraries and at EPA Headquarters, Grants Administration Division, 401 M Street SW, Washington, D.C. 20460

MONTHLY LISTING OF AWARDS FOR CONSTRUCTION GRANTS FOR WASTEWATER TREATMENT WORKS

Awards for the wastewater treatment facilities construction grants under Public Law 92-500 made during a particular month are listed in a monthly publication entitled "Monthly Listing of Awards for Construction Grants for Wastewater Treatment Works." This publication is prepared by the Grants Administration Division and distributed and sold by the National Technical Information Service (NTIS).

The March 1974 issue (PB23130) provides a base listing of all grants awarded under Public Law 92-500. Beginning with the April 1974 issue (PB231300-01), the listings contain awards for one month only and are numbered in sequence. Microfiche (24X) of each copy is also available. The subscription price is \$120.00 for 12 issues plus one issue of the yearly "State Priority Lists for Construction Grants for Wastewater Treatment Works." Previous issues can be purchased at \$10.50 per copy.

The publication is distributed to subscribers approximately six weeks after the close of the awards-listed month. It may be obtained through:

National Technical Information Service
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
(703) 557-4650

FEDERAL ASSISTANCE PROGRAMS OF THE ENVIRONMENTAL PROTECTION AGENCY

This publication includes descriptive information about Environmental Protection Agency assistance programs reprinted from the Catalog of Federal Domestic Assistance, which was prepared for the Office of Management and Budget. Similar information on programs of all Federal agencies is included in the Catalog which is available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20420 for \$18.00 and includes changes as issued. It is also available for public use in Federal Depository Libraries.

Copies of this publication may be obtained from the Environmental Protection Agency, Grants Operations Branch, Grants Administration Division (PM-216), 401 M Street SW, Washington, D.C. 20460.

NOTE: All of the preceeding publications are available for examination at the Grants Administration Division and Library of EPA Headquarters and each Regional Office.

OTHER GRANT-RELATED INFORMATION

A brief summary of a grant project is available on the majority of research and demonstration grants.

These summaries are available for projects that have received Federal funding. In rare instances, a grant application may contain privileged information and is so designated. For these, only the award data, such as grant number, applicant name, organization, location, grant title, amount awarded, and award date is available. Other information may be available depending on the particular circumstances.

The Smithsonian Science Information Exchange (SSIE), room 300, 1730 M Street, N.W., Washington, D.C. 20036, receives a copy of the summary of a grant and makes it available to the public on a fee basis. The cost of a print-out, if the Agency is identified and the grant or contract number is provided, costs \$2.00 per grant number with a \$10.00 minimum fee. A search on a subject (topic) is \$60.00 per search service for 1 to 50 titles, and an additional charge of 25¢ per title. A search on the investigator's name can also be performed. All inquiries and requests for this service should be addressed to SSIE or phone (202) 381-4211.

REPORTS GENERATED BY GRANT SUPPORTED PROJECTS

Final reports and other program reports generated by grant supported projects are published and made available if merited. Final report information is available from the following program offices:

Solid Waste Management & Resource Recovery:

Publication and Distribution Unit
Office of Solid Waste Management
Environmental Protection Agency
Cincinnati, Ohio 45268

Air Pollution Control:

Library MD-35
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Pesticide Publications:

Information Section WH-569
Office of Pesticide Programs
Environmental Protection Agency
401 M Street SW
Washington, D.C. 20460

Other Research & Demonstration Projects:

Technology Transfer Staff
Office of Research & Development
Environmental Protection Agency
Cincinnati, Ohio 45268

EPA REPORTS BIBLIOGRAPHY QUARTERLY SUPPLEMENT

(Sponsored by Library Systems Branch)

The EPA Cumulative Bibliography 1970-1976 published in December 1976 (NTIS Number PB265920, price quote obtained from NTIS) contains a bibliographic citation with abstracts for reports generated by EPA and its predecessor agencies and entered into the NTIS collection through 1976. Access points to this information are by Report Title, Subject (keyword), Corporate or Personal Author, Contract Number, and Accession/Report Number.

Beginning in March 1977, quarterly update supplements will be published listing and indexing EPA technical reports and journal articles entered into the NTIS collection during the preceding quarter. An additional index titled "Sponsoring EPA Office" is included as well. The fourth quarterly issue will cumulate and become the annual index for the year.

To order documents or subscriptions, contact the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. Do not order from the U.S. Environmental Protection Agency. If what you have ordered is in stock on hand, you should receive your order within two weeks after it arrives at NTIS. If what you have ordered must be reproduced from a microform, or if all the paper copies have been sold and reprints are in process, you should receive your order within four to six weeks. Infrequently, orders may be further delayed by a contractor's inability to deliver to NTIS. You will be notified if such a delay is expected.

The EPA Reports Bibliography Quarterly Supplement series is available on annual subscription from NTIS at a cost of \$45.00 for North American Continent users (single copies, when available, are \$12.50 each). For those outside the North American Continent, please write NTIS for prices.

The following EPA Libraries maintain for reference purposes completed sets of EPA reports on microfiche.

Region I Library Room 2211-B, JFK Federal Bldg. Boston, Massachusetts 02203	Environmental Research Center Library 26 West St. Clair Street Cincinnati, Ohio 45268
National Marine Water Quality Lab P. O. Box 277 West Kingston, Rhode Island 02892	Environmental Research Lab-Duluth 6201 Congdon Boulevard Duluth, Minnesota 55804
Region II Library 26 Federal Plaza New York, New York 10007	Region VI Library First International Bldg. 1201 Elm Street Dallas, Texas 75270
Region II Field Office Library Edison, New Jersey 08817	Robert S. Kerr Environmental Research Laboratory P. O. Box 1198 Ada, Oklahoma 74820
Region III Library Curtis Bldg., 6th & Walnut Streets Philadelphia, Pennsylvania 19106	Region VII Library 1735 Baltimore Avenue, Room 249 Kansas City, Missouri 64108
Headquarters Library, Room 2404 WSM 401 M Street, SW Washington, D.C. 20460	Region VIII Library 8M-ASL 1860 Lincoln Street Denver, Colorado 80225
Region IV Library 345 Courtland Street, N.E. Atlanta, Georgia 30309	National Field Investigation Center Room A-1209, Bldg. 53 Box 25227, Denver Federal Center Denver, Colorado 80225
Library Services MD-35 Research Triangle Park North Carolina 27711	Region IX Library 100 California Street San Francisco, California 94111
Southeast Environmental Research Lab College Station Road Athens, Georgia 30601	National Environmental Research Center P. O. Box 15027 Las Vegas, Nevada 89114
Gulf Breeze Laboratory Sabine Island, Bldg. 29 Gulf Breeze, Florida 32561	Region X Library 1200 Sixth Avenue Seattle, Washington 98101
Region V Library 230 Dearborn Street, Rm. 1455-A Chicago, Illinois 60604	National Environmental Research Center 200 S.W. 35th Street Corvallis, Oregon 97330

SECTION I

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARDED
A L A B A M A						
** RESEARCH ** ALABAMA A.S.M. UNIV. NORMAL	MICROBIAL DEGRADATION OF CHLORINATED HYDROCARBON PESTICIDE IN FRESHWATER ECOSYSTEMS	SAVAGE, J.	80393302	CONT	78/03/27	858,434
ALABAMA, UNIV. OF UNIVERSITY	ASSESSMENT OF HYDROCARBONS IN THE MARINE ENVIRONMENT	RENTSCH, W.	80474802	CONT	78/01/19	840,953
ALABAMA, UNIV. OF UNIVERSITY	DETERMINANTS OF DRINKING WATER DEMAND AND THE ECONOMICS OF SUPPLY SYSTEM CONSOLIDATION	HELMES, P.	80501701	NEW	78/03/09	852,316

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
A L A S K A						
** RESEARCH ** EMMONAK, CITY OF EMMONAK	ALASKA VILLAGE RESEARCH PROJECT	NEOFOX, D.	80566001	INCR	77/11/21	995,000
WAINWRIGHT, CITY OF WAINWRIGHT	ALASKA VILLAGE RESEARCH PROJECT	NAYAKIN, C.	80566101	INCR	77/11/21	8120,700

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH ** ARIZONA, UNIV. OF TUCSON		WENDT, J. O. EFFECT OF FUEL SULFUR ON NITROGEN OXIDE FORMATION IN COMBUSTION PROCESSES	80371502	INCR	78/01/20	949,973
ARIZONA, UNIV. OF TUCSON		CRUMDER, L. MODE OF ACTION OF CYCLODIENE INSECTICIDES	80435103	CONT	77/12/29	827,849
ARIZONA, UNIV. OF TUCSON		HOENING, S. USE OF ELECTROSTATIC CHARGED FOG FOR CONTROL OF DUST FROM OPEN SOURCES	80522802	CONT	78/03/31	5106,074
ARIZONA, UNIV. OF TUCSON		RATHJE, W. L. SOLID WASTE REDUCTION AND MASS MEDIA CAMPAIGNS	80563501	NEW	77/11/23	398,715
ARIZONA, UNIV. OF TUCSON		FULLER, W. APPLICATION LAPIDUS-AMUNDSON SOLUTE MOVEMENT MODEL TO PREDICT SOIL ATTENUATION OF LEACHATAGE METALS	80573101	NEW	78/02/06	375,000

ARIZONA

APPLICANT	MUNICIPALITY	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
ATMOSPHERIC RES. GROUP	ALTADENA	ENSON, D.	80565001	NEW	76/02/17	873,302
CALIFORNIA, UNIV. OF	RIVERSIDE	PITTS, J.	80064918	INCR	77/11/16	859,870
CALIFORNIA, UNIV. OF	RIVERSIDE	FUKUTO, T.	80434503	CONT	76/02/16	8112,000
CALIFORNIA, UNIV. OF	RIVERSIDE	TAYLOR, O.	80541001	INCR	76/01/20	8130,840
CALIFORNIA, UNIV. OF	IRVINE	OLSON, B.	80568001	NEW	76/02/27	860,876
CALIFORNIA, UNIV. OF	SANTA BARBARA	OFFEN, HENRY	80560301	NEW	76/03/15	865,104
CONTRA COSTA CNTY. HEALTH DEPT.	MARTINEZ	WOOD, O.	80555101	INCR	76/02/24	81,500
JOHN MUIR INST. FOR ENVRN. STUDIES	NAPA	MALM, N.	80578601	NEW	76/02/14	819,924
LAFAYETTE, CITY OF	LAFAYETTE	HARRINER, C.	80567201	NEW	76/01/09	8125,960
MOULTON NIGUEL WATER DIST.	LAGUNA	O'CONNOR, J.	80527901	INCR	76/02/07	836,834

CALIFORNIA

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** RESEARCH **						
OCCIDENTAL COLLEGE LOS ANGELES	SEASONAL CYCLES IN BODY COMPOSITION ORGAN SYSTEM FUNCTION & ENERGETICS OF GRASSLAND BIRDS	MORTON, M.	80558101	INCH	78/02/22	\$9,031
SOUTHERN CALIFORNIA METRO WATER DIST. LOS ANGELES	WATER QUALITY EFFECTS RELATED TO BLENDING WATERS OF DIFFERENT ORIGIN IN DISTRIBUTION SYSTEMS	PEARSON, M. E.	80070901	INCH	78/02/13	\$5,859
STANFORD RES. INST. MENLO PARK	ATMOSPHERIC PAIRS OF HALOGENATED COMPOUNDS	SINGH, M. B.	80380203	CONT	78/03/13	\$65,000
STANFORD UNIV. STANFORD	APPLICATION OF ADSORPTION THEORY TOWARDS VIRUS DECONTAMINATION	PARKS, G.	80501001	INCR	77/12/14	\$4,297
** DEMONSTRATION **						
EAST BAY MUN. UTIL. DIST. OAKLAND	PROCESSING, ECONOMICS & SALE OF HEAT DRIED SLUDGE	LARKIN, D.	80489501	INCR	78/01/30	\$12,250
MOUNTAIN VIEW, CITY OF MOUNTAIN VIEW	SHORELINE REGIONAL PARK GAS RECOVERY PROGRAM	CARLSON, JOHN A.	80339601	INCR	78/01/30	\$70,000
** TRAINING **						
ASSOCIATION OF BAY AREA GOVTS. BERKELEY	PROPOSAL TO DEMONSTRATE PROCEDURES FOR PREPARING AIR QUALITY PLANS	HASEVIA, G.	90081001	NEW	78/03/29	\$20,913
CALIFORNIA STATE UNIV. SACRAMENTO	REVISION AND EXPANSION OF OPERATION OF WASTE WATER TREATMENT PLANTS	KEMRI, K.	90069001	INCR	77/11/15	\$47,500
SIERRA CLUB SAN FRANCISCO	CITIZEN EDUCATION ON THE CLEAN AIR ACT AMENDMENTS	POPE, C.	90078401	NEW	78/02/13	\$200,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** TRAINING ** SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES		MCGINTY, R. RESEARCH AND DEVELOPMENT OF METRO APEX WATER PLANNING AND GAMING SIMULATION	90059302	INCR	77/11/23	871,042
** FELLOWSHIPS ** CALIFORNIA, UNIV. OF IRVINE		MUNGER, H. PH.D./ENVR.	91079101	INCR	77/11/16	82,265
CONTROL DATA INST. LOS ANGELES		ELVIN, B. COMPUTER PROGRAMMING/AIR POLLUTION	91104801	INCR	77/11/02	8400
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES		JONES, J. NIKKI M.S./PUBLIC ADMIN./ENVRN. MGMT.	91099001	NEW	77/11/10	84,998

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / PELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C O L O R A D O							
** RESEARCH **							
COLORADO SCH. OF MINES RES. INST.	GOLDEN		KLOPPER, DEAN L. MINERALOGY OF OVERBURDEN RELATED TO GROUND-WATER DEGRADATION IN STRIP MINING OF COAL	80418201	INCR	78/02/06	\$11,542
COLORADO STATE UNIV.	FORT COLLINS		MCHURTER, D. B. WATER QUALITY HYDROLOGY AFFECTED BY OIL SHALE DEVELOPMENT	80368402	INCR	78/01/19	\$14,440
COLORADO STATE UNIV.	FORT COLLINS		MISLER, CHARLES P. CROSS TRANSMISSION OF GIARDIA	80521501	INCR	78/03/09	\$38,365
COLORADO STATE UNIV.	FORT COLLINS		WAND, M. EVALUATION OF STATISTICAL & ECONOMIC FACTORS IN DESIGN OF WATER QUALITY MONITORING NETWORKS	80575901	NEW	78/02/13	\$12,996
COLORADO STATE UNIV.	FORT COLLINS		SKOGERBOE, G. EVALUATING FURROW IRRIGATION EFFICIENCY FOR REGIONAL WATER QUALITY PLANS	80581101	NEW	78/03/20	\$177,942
COLORADO, UNIV. OF	BOULDER		CHAPPELL, M. R. HEALTH EFFECTS OF CONSUMPTION OF RENOVATED WATER-CHEMISTRY AND CYTOTOXICITY	80396803	INCR	78/02/06	\$2,000
DENVER, UNIV. OF	DENVER		VENDITTI, F. TRANSFER AND UTILIZATION OF PARTICULATE CONTROL TECHNOLOGY	80572501	NEW	77/11/16	\$89,940
DENVER, UNIV. OF	DENVER		HINARD, G. HIGH VOLTAGE CONTROL & ELECTROSTATIC FIELD INVESTIGATIONS	80573301	NEW	78/02/22	\$193,800
** TRAINING **							
AMERICAN WATER WORKS ASSOC.	DENVER		MASKINS, B. D. WATER TREATMENT PLANT OPERATIONS AND LABORATORY ANALYSES	80063201	INCR	78/03/13	\$29,736

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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COLORADO

** TRAINING **
COLORADO DEPT. OF HEALTH
DENVER

PROJECT LONGSISIS OF OBTAINING TRAINING MANUALS & TEACHING A TWO DAY SEMINAR.	GEORGE A PRINCE, SUPER	00021201	NEW	76/03/30	\$8,300
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APPLICANT

MUNICIPALITY

PROJECT DIRECTOR /
FELLOW

TITLE

CHART NO

TYPE OF
GRANT

DATE OF
AWARD

AMOUNT UP
GRANT AWARD

L U N N E C T I C U T

RESEARCH

YALE UNIV.
NEW HAVEN

CHANG, R.
LABORATORY MONITORING OF SULFURIC ACID,
SULFATES, SULFUR TRIOXIDE & SULFUR DIOXIDE IN STACK EMISSION

80545801

NEW

78/03/15

\$59,000

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
DELAWARE							
** RESEARCH **	DELAWARE, UNIV, OF NEWARK	HINDERANCE OF COLIFORM RECOVERY BY TURBIDITY & NON-COLIFORMS	HEWSON, D.	80510202	CONT	78/02/22	841,110
** TRAINING **	DELAWARE DEPT OF NAT RES & ENV CONTROL DOVER	WASTEWATER TREATMENT	AUSTIN P. OLNEY	00312702	CONT	77/10/05	88,000

APPLICANT MUNICIPALITY TITLE PROJECT DIRECTOR / FELLOW GRANT NO TYPE OF GRANT DATE OF AWARD AMOUNT OF GRANT AWARD

DISTRICT OF COLUMBIA

RESEARCH ** ENVIRONMENTAL LAW INST. WASHINGTON	ANDERSON, ROBERT C. EVALUATION OF ECONOMIC BENEFITS OF RESOURCE CONSERVATION THROUGH RECYCLING	80388001	INCR	77/12/14	83,947
ENVIRONMENTAL LAW INST. WASHINGTON	TARLOCK, A. O. MANAGEMENT OF ENVRN. QUALITY PREPARING FOR IMPLEMENTATION OF INTEGRATED REGIONAL PROGRAMS	80446901	INCR	78/02/27	811,997
ENVIRONMENTAL LAW INST. WASHINGTON	ANDERSON, R. ANALYSIS OF SCRAP MATERIAL SUPPLY AND DEMAND	80579901	NEW	77/12/29	867,209
PUBLIC TECHNOLOGY, INC. WASHINGTON	MILLER, G. MADE STATUS OF OZONATION & CHLORINE DIOXIDE TECHNOLOGIES FOR TREATMENT OF MUNICIPAL WATER SUPPLIES	80438501	INCR	78/01/05	839,874
SMITHSONIAN INST. WASHINGTON	CORRELL, DAVID L. NON-POINT POLLUTION STUDIES ON AGRICULTURAL LAND USE TYPES PREVALENT IN COASTAL PLAIN ZONE OF MD.	80453601	INCR	78/03/31	8137,067
DEMONSTRATION ** PUBLIC INTEREST ECONOMICS CENTER WASHINGTON	FERGUSON, ALLEN R. CHARGING SOLID WASTE COSTS AT THE POINT OF PRODUCTION	80481901	INCR	77/12/29	828,029
TRAINING ** AMERICAN INST HUM RES, EDUC & TRAINING WASHINGTON	FLETCHER, J. STRENGTHENING LOCAL GOVT. CAPACITY TO PROVIDE SAFE DRINKING WATER	90074901	INCR	78/02/02	849,832
AMERICAN PUBLIC HEALTH ASSOC. WASHINGTON	WROBECK, S. RESOURCE CONSERVATION & RECOVERY ACT OF 1976 FOR HEALTH & ENV. PERSONNEL	90076801	NEW	77/12/23	819,575
CONSERVATION FDN. WASHINGTON	DAVIS, J.C. TRAINING CONFERENCES FOR THE OFFICE OF TOXIC SUBSTANCE	90082902	CONT	78/03/02	8129,091

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING **						
D.C. DEPT OF ENV SVCS WASHINGTON		CHARLES E. ANDREWS SAFETY PROGRAM	00313001	NEW	77/10/05	87,000
ENVIRONMENTAL ACTION FDN. WASHINGTON		MENTWORTH, M. CITIZENS WATER COMMUNICATIONS NETWORK	90077701	NEW	77/12/08	849,979
ENVRN. ACTION FDN. WASHINGTON		MUNSON, R. CITIZEN ASSISTANCE TO STATE IMPLEMENTATION OF RCRA	90072101	INCR	78/01/10	86,931
INTERNATIONAL CITY MGMT. ASSOC. WASHINGTON		MART, C. SOLID WASTE TECH. ASST. FOR LOCAL GOV'T. MGMS.	90078801	NEW	78/03/10	878,750
LEAGUE OF CITIES-CONFERENCE OF MAYORS WASHINGTON		WILLIAMS, L. A. SOLID WASTE MANAGEMENT PROJECT	90060701	INCR	78/01/05	820,000
LEAGUE OF WOMEN VOTERS EDUC. FUND WASHINGTON		O'HARA, C. 200 MAIER QUALITY MANAGEMENT PROJECT	90060502	CONT	77/11/23	8124,871
LEAGUE OF WOMEN VOTERS EDUCATION FUND WASHINGTON		VALDES-COGLIANO, SALLY PUBLIC EDUCATION TO SUPPORT HAZARDOUS & SOLID WASTE MGMT	90071501	INCR	78/03/09	89,933
NATIONAL ASSOC. OF CONSERVATION DIST. WASHINGTON		UNCER, DAVID G. EVALUATION & TECHNICAL TRANSFER TO IMPLEMENT NPS PHASE OF 208 (208 NPS IMPLEMENTATION PROJECT)	90074401	INCR	77/10/27	8133,575
NATIONAL ASSOC. OF COUNTIES WASHINGTON		HASLIN, M. PROJECT TO ASSIST LOCAL GOVERNMENTS TO IMPLEMENT WASTEWATER CONSTRUCTION PROJECTS	90057001	INCR	77/11/22	8289,959
NATIONAL ASSOC. OF COUNTIES RES. FDN. WASHINGTON		BULGER, THOMAS J. TECHNICAL ASSISTANCE FOR COUNTIES IN SOLID WASTE MANAGEMENT	90065701	INCR	78/01/10	87,074

DISTRICT OF COLUMBIA

227

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
DISTRICT OF COLUMBIA						
** TRAINING **						
NATIONAL ASSOC. OF COUNTRIES RES. FDN. WASHINGTON	PROPOSAL TO ASSIST WITH IMPLEMENTATION OF CLEAN AIR ACT AMENDMENTS OF 1977	WEAVER, R.	90075701	INCR	78/02/14	\$19,982
NATIONAL ASSOC. OF REG. COUNCILS WASHINGTON	IMPLEMENTING WATER QUALITY MANAGEMENT PLANS	WEBSTER, R.	90077801	NEW	77/12/12	\$60,515
NATIONAL ASSOC. OF REGIONAL COUNCILS WASHINGTON	REGIONAL COUNCILS AND SOLID WASTE MGMT.	WEBSTER, R.	90078501	NEW	78/01/30	\$59,005
NATIONAL LEAGUE OF CITIES WASHINGTON	LOCAL GOVT. CAPACITY TO PROVIDE SAFE DRINKING WATER	FLETCHER, J.	90074901	NEW	77/12/09	\$199,400
NATIONAL WILDLIFE FED. WASHINGTON	RURAL SOLID WASTE MANAGEMENT EDUCATION PROGRAMS	HAMPTON, K. R.	90064101	INCR	78/01/10	\$59,806
NATIONAL WILDLIFE FEDER. WASHINGTON	RCRA STATE PUBLIC EDUCATION FORUMS	HAMPTON, K.	90077301	NEW	77/12/23	\$66,000
PUBLIC TECHNOLOGY, INC. WASHINGTON	WATER SUPPLY SEMINARS-REDUCTION OF TRIHALOMETHANE IN DRINKING WATER	MILLER, G.	90076001	NEW	78/01/25	\$95,125
TECHNICAL INFORMATION PROJECT WASHINGTON	HEIGHTENING PUBLIC AWARENESS OF MUNICIPAL LAND DISPOSAL PROBLEMS	PURCELL, A.	90077001	NEW	77/12/19	\$49,707

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARDED
F L O R I D A						
** RESEARCH ** FLORIDA ST. UNIV. TALLAHASSEE	HIGH SENSITIVITY FT NMR STUDIES OF ENV. TOXIC MATERIALS	GEORGE C. LEVY	80491602	CONT	78/01/16	\$36,838
FLORIDA STATE EPIDEMIOLOGY RES. CTR. TAMPA	MONITORING FOR PATHOGENIC NAEGLERIA	WELLINGS, FLORA M.	80437502	INCR	78/03/31	\$5,286
FLORIDA STATE UNIV. TALLAHASSEE	DETERMINATION OF STATISTICAL METHODS USED TO IDENTIFY TRUPHO-DYNAMIC INVOLVEMENT	LIVINGSTON, R. J.	80528601	INCR	78/03/10	\$535
MIAMI, UNIV. OF CORAL GABLES	STORAGE AND EXCRETION OF HALOGENATED AND NON HALOGENATED ORGANOPHOSPHORUS PESTICIDES IN ANIMALS	ENOS, M.	80435303	CONT	78/01/27	\$81,100
WEST FLORIDA, UNIV. OF PENSACOLA	CYCLING OF XENOBIOTICS THROUGH ESTUARINE AND MARINE SEDIMENTS	D'ASARO, CHARLES	80445802	CONT	78/03/15	\$99,917
WEST FLORIDA, UNIV. OF PENSACOLA	WATER QUALITY & EUTROPHICATION STUDIES IN SANTA ROSA SOUND IN THE PROXIMITY OF ESCAMBIA & SANTAROSA	MOSHIRI, G.	80536601	INCR	77/12/14	\$2,500
** DEMONSTRATION ** FLORIDA DEPT. OF ENVRN. REGULATION TALLAHASSEE	LAKE JACKSON NON-POINT SOURCE ABATEMENT PROGRAM	FARLEY, DAN	80481501	INCH	78/01/10	\$469,513
FLORIDA GAME & FRESH WATER FISH COMM. TALLAHASSEE	LAKE APOPKA RESTORATION PROJECT	FAYE, O. E.	80419101	INCH	78/01/06	\$71,834

APPLICANT MUNICIPALITY PROJECT DIRECTOR / FELLOW GRANT NO TYPE OF GRANT DATE OF AWARD AMOUNT OF GRANT AWARD

TITLE

GEORGIA

** RESEARCH **

GEORGIA INST. OF TECH.
ATLANTA

GEORGIA, UNIV. OF
ATHENS

GEORGIA, UNIV. OF
SAPELO, ISLAND

POHLAND, F.
CONTROLLED LANDFILL STABILIZATION BY LEACHATE
RECYCLE

CARRERA, L.
NEW LIQUID CHROMATOGRAPHIC DETECTION SYSTEM
FOR ENVIRON. POLLUTANTS

WOLF, P.
DETRITUS DYNAMICS OF FOOD WEBS IN FRESHWATER
WETLANDS & ADJACENT ESTUARINE SYSTEM

80395302 INCR 78/02/14 \$25,000

80415503 CONT 77/12/21 \$93,200

80583301 NEW 78/03/20 \$10,000

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **	HAWAII, UNIV. OF KANELOHE						
H A W A I I							
		RESPONSES OF A TROPICAL ESTUARY TO RELAXATION OF SEAGE STRESS	SMITH, S.	80390303	CONT	78/01/19	830,000
				80390303	INCR	78/03/10	8150,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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ILLINOIS

** RESEARCH **

CHICAGO METRO. SAN. DIST.
CHICAGO

ENVRN CHANGES AGRICULTURAL BENEFITS FROM
USING MUN SEWAGE SLUDGE/CROP PRODUCTION/STRIP-MINED SOILS

BRAXTON, J. S.

INCR

78/03/02

836,000

IIY RESEARCH INST.
CHICAGO

DEVELOPMENT & EVAL. OF AN AMBIENT VIABLE
MICROBIAL AIR SAMPLE

FANNIN, K.

NEW

78/03/20

895,259

ILLINOIS, UNIV. OF
URBANA

MINERAL MATTER IN COAL

GLUSKOTER, M.

CONT

78/03/10

855,939

ILLINOIS, UNIV. OF
URBANA

PREDICTING ORGANIC CONTAMINANT REMOVAL
BY CLAY MINERALS & WASTE MATERIALS

GRIFFIN, ROBERT A.

INCR

78/03/28

88,000

ILLINOIS, UNIV. OF
URBANA

UNIV. OF ILLINOIS CORE TEAM PARTICIPATION
IN OHIO RIVER BASIN ENERGY STUDY

STUKEL, JAMES, J.

INCR

77/12/30

866,434

ILLINOIS, UNIV. OF
URBANA

EXPERIMENTAL MANAGEMENT PLAN FOR OHIO RIVER
BASIN ENERGY STUDY

STUKEL, J.

INCR

77/12/16

8417,715

ILLINOIS, UNIV. OF
URBANA

APPLICATION OF MICROPROCESSOR TECHNOLOGY
TO BIOBEHAVIORAL DATA ACQUISITION

DONCHIN, E.

NEW

77/12/05

857,928

** TRAINING **

AMERICAN PUBLIC WORKS ASSOC.
CHICAGO

PROVIDE INCREASED SOLID WASTE MANAGEMENT
SERVICES TO STATE AND LOCAL AGENCIES

FLEMING, R.

INCR

78/01/10

810,000

SOUTHERN ILLINOIS UNIV.
EDWARDSVILLE

TROUBLESHOOTING O & M PROB. AT MUNICIPAL
TREATMENT FAC.

BRYANT, J.

NEW

78/03/02

824,106

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
I O W A						
** RESEARCH ** AMES, CITY OF AMES	EVALUATION OF AMES SOLID WASTE RESOURCES & ENERGY RECOVERY SYSTEM	CHANTLAND, A.	80390303	CONT	78/03/03	8900,000
IOWA STATE UNIV. AMES	METHODS FOR DISPOSAL OF EXCESS PESTICIDES USED BY FARMERS	HALL, C.	80453302	INCR	78/01/05	816,087
IOWA STATE UNIV. AMES	DEVEL. & TESTING OF MATHEMATICAL MODELS AS MGMI. TOOLS FOR AGRICULTURAL NON-POINT POLLUTION CONTROL	JOHNSON, M.	80410202	INCR	77/11/22	826,825
IOWA STATE UNIV. AMES	FRESHWATER MARSHES AS NUTRIENTS SINKS FOR NON-POINT SOURCES OF AGRICULTURAL RUN-OFF	DAVIS, C.	80502601	NEW	78/03/27	823,832
** DEMONSTRATION ** IOWA STATE CONSERVATION COMM. DES MOINES	BLUE LAKE RESTORATION PROJECT	ALBRIGHT, T. M.	80556601	NEW	77/11/10	8372,500

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
K E N T U C K Y						
** RESEARCH ** INTERSTATE MINING COMPACT COMM. LEXINGTON		BOWLING, K. PREPARE AUDIO-VISUAL INSTRUCTIONAL COURSE ON SURFACE MINING & THE ENVIRONMENT	80497202	CONT	78/02/17	\$225,466
KENTUCKY, UNIV. OF LEXINGTON		GRIEVES, ROBERT B. CHARGED MEMBRANE UF & SULFIDE PRECIPITATION TO TREAT NONFERROUS METAL PRODUCTION WASTES	80456802	INCR	77/11/10	\$24,941
KENTUCKY, UNIV. OF LEXINGTON		BLOME, D. OHIO RIVER BASIN ENERGY STUDY: PHASE II	80559001	INCR	77/11/21	\$50,000
LOUISVILLE, UNIV. OF LOUISVILLE		SPENCER, E. IMPACT ASSESSMENT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN: PHASE II	80556901	INCR	77/11/16	\$30,000

APPLICANT

MUNICIPALITY

TITLE

PROJECT DIRECTOR /
FELLOW

GRANT NO

TYPE OF
GRANT

DATE OF
AWARD

AMOUNT OF
GRANT AWARD

LOUISIANA

** RESEARCH **

JEFFERSON PARISH
JEFFERSON

LOUISIANA STATE UNIV. & A&M COLLEGE
BATON ROUGE

GRANULAR ACTIVATED CARBON STUDIES
BRODTMANN, NOEL V.

80457101

INCR 77/10/25

830,861

CARCINOGEN DETECTION IN PUBLIC WATER SUPPLIES
& SOURCES WITH MANHALLIAN CELL MONITORS
PELON, WILLIAM

80018803

INCR 78/01/20

842,859

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M A R Y L A N D						
** RESEARCH ** JOHN HOPKINS UNIV. BALTIMORE	PROPOSAL TO PREPARE A BOOK ON SEAS MODEL AND POLICY APPLICATIONS	LAKSHMANAN, T.	80580001	NEW	79/02/13	\$11,307
** TRAINING ** MARYLAND DEPT OF HEALTH & MENTAL HYG BALTIMORE	TREATMENT PLANI OPERATOR TRAINING	JACK W. KERNS	00313201	NEW	77/10/05	\$10,000

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT UP GRANT AWARD
M A S S A C H U S E T T S							
** RESEARCH **							
ARTHUR D. LITTLE, INC.	CAMBRIDGE	PROCESS FOR ACTIVATED CARBON REGENERATION & FOR RECOVERY OF HAZARDOUS PESTICIDE WASTE	DE FILIPPI, R. P.	80455401	INCR	78/02/07	\$108,000
HARVARD COLLEGE	CAMBRIDGE	IDENTIFICATION AND DETECTION OF WATER-BORNE VIRUSES BY IMMUNOENZYMATIC METHODS	HERRMANN, JOHN	80336003	CONT	77/11/21	\$50,000
HARVARD COLLEGE	CAMBRIDGE	HIGH VELOCITY FABRIC FILTRATION	FIRST, M.	80470002	INCR	78/02/24	\$29,549
HARVARD UNIV.	CAMBRIDGE	EFFECTS OF SO ₂ AND SULFATES ON RESPIRATORY DEFENSE MECHANISMS	BRAIN, J.	80509102	CONT	78/02/16	\$80,000
MARLBOROUGH, CITY OF	MARLBOROUGH	HIGH OZONE ZONE DISINFECTION STUDY	SHARON, P.	80494601	INCR	77/11/10	\$62,500
MASSACHUSETTS UNIV. MEDICAL SCHOOL	N. WORCHESTER	DETECTION OF VIRAL GASTROENTERITIS AGENTS	BLACKLOW, N.	80516902	CONT	78/03/27	\$49,883
MASSACHUSETTS, UNIV. OF	AMHERST	SHORT COURSE ON APPLICATION OF STORMWATER MANAGEMENT MODELS	DEGIAND, FRANCIS	80306901	INCR	78/01/06	\$12,458
MASSACHUSETTS, UNIV. OF	AMHERST	HUMAN HEALTH EFFECTS OF ELEVATED DRINKING WATER SODIUM LEVELS	TUTHILL R.M.	80561201	NEW	78/02/13	\$112,339
META SYSTEMS INC.	CAMBRIDGE	WATER QUALITY IMPACT & SOCIO-ECONOMIC ASPECTS OF REDUCING NONPOINT SOURCE POLLUTION FROM AGRI.	BURDEN, R. P.	80503601	INCR	78/02/24	\$9,858
NEW ENGLAND AQUARIUM	BOSTON	OCEAN DISP. TEST PROGRAM FOR TREATED FGD MATERIALS	MCLEOD, G.	80565401	NEW	77/11/16	\$29,960

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MASSACHUSETTS						
** RESEARCH ** NEW ENGLAND FISHERIES STEERING COMM. NEW BEDFORD	ELECTROCHEMICAL COAGULATION STUDY FOR FISH PROCESSING WASTEWATER	NICKERSON, M.	60549301	INCR	76/01/19	\$65,500
NORTHEASTERN UNIV. BOSTON	CHARACTERIZATION OF SOLIDS BEHAVIOR IN AND VARIABILITY TESTING OF SELECTED CONTROL TECHNIQUES	BLANC, F. C.	60457801	INCR	76/01/05	\$130,966
SALEM & BEVERLY WATER SUPPLY BOARD BEVERLY	EFFECTS OF TURBIDITY ON BACTERIAL COUNTS AND COLIFORM ENUMERATION IN WATER DISTRIBUTION SYSTEM	REILLY, J.K.	60472402	CONT	77/10/25	\$30,000
** DEMONSTRATION ** BOSTON, CITY OF BOSTON	DEMONSTRATION OF SWIRL & HELICAL BEND REGULATORS AS STORM SEWER CONTROL DEVICES	SCALES, CHARLES	60579501	NEW	76/03/27	\$123,302
MASSACHUSETTS METROPOLITAN DIST. COMM. BOSTON	LOWEN MYSTIC LAKE SALT WATER REMOVAL	FERULLO, A. F.	60502901	NEW	77/11/21	\$320,000
W.R. GRACE & CO. LEXINGTON	TREATMENT OF WASTEWATERS FROM ADHESIVES & SEALANTS MANUFACTURE BY ULTRAFILTRATION	PECEVICH, JOHN	60435001	INCR	76/03/10	\$1,062
** TRAINING ** CHILDREN'S MUSEUM BOSTON	INDUSTRIAL WASTE GENERATION & DISPOSAL	GURIAN, E.	90077601	NEW	76/01/05	\$9,894

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I C H I G A N						
** RESEARCH **						
CRANBROOK INST. OF SCI. GLUONFIELD HILLS	SURVEY OF NUTRIENTS & HAZARDOUS MATERIALS IN SAGINAW BAY, MI	SMITH, VAN ELLIOT	80444203	CONT	78/03/20	\$202,254
CRANBROOK INST. OF SCIENCE GLUONFIELD HILLS	SURVEY OF NUTRIENTS & HAZARDOUS MATERIALS IN SAGINAW BAY	SMITH, VAN ELLIOT	80444202	INCR	78/02/13	\$33,778
HAZARDOUS MATERIAL CONTROL RES. SOUTHFIELD	THE 1978 NATIONAL CONFERENCE ON CONTROL OF HAZARDOUS MATERIAL SPILLS	USHER, D.	80522301	INCR	78/03/27	\$15,000
MICHIGAN TECH. UNIV. HOUGHTON	UTILITY OF WET OXIDATION IN THE TREATMENT OF HAZARDOUS ORGANIC WASTES	KENT, JAMES A.	80556501	NEW	78/03/22	\$40,000
MICHIGAN, UNIV. OF ANN ARBOR	LONG PATH AIR POLLUTION MONITOR EVALUATION	BARTMAN, F. L.	80339903	INCR	78/01/06	\$30,000
MICHIGAN, UNIV. OF ANN ARBOR	DEVELOPMENT & APPLICATION OF AN OZONE VOLTAMETRIC MEMBRANE ELECTRODE	WANCY, K.	80483402	CONT	77/11/22	\$50,260
MICHIGAN, UNIV. OF ANN ARBOR	DEVELOPMENT OF VITRO TEST SYSTEM EVALUATION OF TERATOGENS	BEAUDOIN, A.	80512502	CONT	78/02/02	\$33,332
MICHIGAN, UNIV. OF ANN ARBOR	HEAVY METAL ACCUMULATION IN BENTHIC ALGAL COMM.	SICKU-GOAO, L.	80514602	CONT	78/01/30	\$43,555
MICHIGAN, UNIV. OF ANN ARBOR	ASSESSMENT OF THE PRESENT STATUS OF BENTHIC MICRO-INVERTEBRATES IN LAKE MICHIGAN	MOZLEY, S.	80533301	INCR	78/03/10	\$7,569
MICHIGAN, UNIV. OF ANN ARBOR	CHEMICAL AMPLIFIERS AS ODD HYDROGEN RADICAL DETECTORS	STEUMAN, D.	80572101	NEW	78/03/22	\$45,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I C H I G A N						
** RESEARCH ** MICHIGAN, UNIV. OF ANN ARBOR	QUANTITATIVE CHARACTERIZATION OF GREAT LAKES PHYTOPLANKTON POPULATIONS	STOEHMER, E.	80579001	NEW	78/02/27	\$66,091
SOUTHERN MISSISSIPPI, UNIV. OF HATTIESBURG	EFFECTS OF PETROLEUM COMPOUNDS ON ESTUARINE FISHES	MARTIN, BILLY J.	80452701	INCR	77/12/30	\$60,000
** DEMONSTRATION ** FORD MOTOR CO. DEARBORN	ELECTROLYTIC TREATMENT OF OILY WASTEWATER	GEALER, K.	80417402	INCR	77/11/22	\$84,000
** TRAINING ** MICHIGAN, WEST, ENV. ACT. ED. FDN. GRAND RAPIDS	CITIZEN EDUCATION & ACTIVITY	CONNER, M.	90077201	NEW	78/01/09	\$12,242
** FELLOWSHIPS ** MICHIGAN TECH. UNIV. HOUGHTON	CIVIL ENGINEERING	WILLIAMS, D.	91116101	NEW	78/03/15	\$6,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MINNESOTA						
** RESEARCH **						
MINNESOTA STATE DEPT OF HEALTH MINNEAPOLIS	HEALTH IMPACT STUDIES OF MINERAL FIBERS IN THE DULUTH MUN. WATER SUPPLY	LAWSON, W.	80542801	INCR	78/03/02	\$21,557
MINNESOTA, UNIV. OF ST. PAUL	FORMATION OF ATMOSPHERIC AEROSOLS	WHITBY, K.	80385103	INCR	78/02/22	\$99,000
MINNESOTA, UNIV. OF MINNEAPOLIS	EFFECT OF TEMPERATURE ON GROWTH AND SURVIVAL OF WHITE SUCKER	SMITH, LLOYD L.	80450101	INCR	78/01/16	\$36,243
MINNESOTA, UNIV. OF ST. PAUL	WATER QUALITY CRITERIA USING CHEMICAL MODELS	HARRISS, D.	80499602	INCR	77/12/19	\$23,683
MINNESOTA, UNIV. OF ST. PAUL	REYE'S SYNDROME & TISSUE ORGANOCHEMICALS/ OTHER CHEMICAL RESIDUES	ROME, R. G.	80512601	INCR	78/02/13	\$33,145
MINNESOTA, UNIV. OF ST. PAUL	OXYGEN PRODUCTION, LOSS, EXCHANGE & TRANSPORT RATES IN RERS FIELD CHANNELS	STEFAN, H.	80567801	NEW	78/02/06	\$33,084
RAMSEY CNTY. ST. PAUL	DETAILED EVALUATION OF LONG LAKE	ANKLAN, D.	80568101	NEW	78/01/06	\$225,000
** DEMONSTRATION **						
HENNEPIN CNTY. PARK RESERVE DIST. MAPLE PLAINS	RESTORATION OF HYLAND LAKE	COCHRAN, D. K.	80470701	INCR	78/01/06	\$62,873
** FELLOWSHIPS **						
MINNESOTA, UNIV. OF MINNEAPOLIS	M.S./ENVIRON. HEALTH-FULL TIME	HACKEY, S.	91104001	INCR	78/02/06	\$218

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **	MISSISSIPPI STATE UNIV. MISSISSIPPI STAT	MISSISSIPPI					
		REACTION OF DISSOLVED POLLUTANTS IN AQUEOUS SOLUTIONS	MAI KUO, C.	60525301	NEW	78/03/22	\$5

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I S S O U R I						
** RESEARCH ** MIDWEST RES. INST. KANSAS CITY	SOCIOECONOMIC & ENVN. IMPACTS OF LAKE IMPROVEMENT PROJECTS	LIU, B.	80559601	NEW	78/02/14	\$275,000
MISSOURI, UNIV. OF COLUMBIA	BIOLOGICALLY MEDIATED CORROSION & DETEIORATION OF WATER QUALITY IN WATER DIST. SYS.	O'CONNOR, J.	80444403	CONT	78/03/15	\$53,060
WASHINGTON UNIV. ST. LOUIS	SULFUR BUDGET IN LARGE PLUMES	MUSAR, R. B.	80389602	INCR	78/02/24	\$44,000
** DEMONSTRATION ** MISSOURI DEPT. OF NATURAL RESOURCES JEFFERSON CITY	FINGER LAKES RESTORATION PROJECT	KARCH, K.	80528401	NEW	78/03/10	\$50,000
MOBERLY, CITY OF MOBERLY	ROTHWELL LAKE REHABILITATION	CALVIN, J.	80531001	NEW	78/02/16	\$45,000
VANDALIA, CITY OF VANDALIA	PREVENTION OF POLLUTION IN HUN. WATER SUPPLY RESERVOIR (VANDALIA RESERVOIR)	BAHR, J. J.	80529501	NEW	78/02/16	\$350,000
** TRAINING ** WATER WASTEWATER TECH. SCH. NEUSHO	EVALUATION, OPERATIONS & MAINTENANCE TRAINING FOR "S" SYSTEMS IN THE U.S. NATIONAL PARKS	LAYTON, RONALD F.	90070201	INCR	78/01/19	\$120,174

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M O N T A N A						
** RESEARCH ** MONTANA STATE UNIV. BOZEMAN		MCFETERS, GORDON	80536301	INCR	78/03/27	\$50,000
	DEVELOPMENTAL EVALUATION OF RAPID MICROBIAL BIOASSAYS FOR AQUATIC HERBICIDES, PESTICIDES, HEAVY METAL					
MONTANA, UNIV. OF MISSOULA		GORDON, C.	80561001	NEW	77/11/23	\$65,000
	INVESTIGATION OF THE BIOENVIRONMENTAL IMPACT OF FOSSIL FUEL-FIRED PLANTS IN THE FORT UNION BASIN					
** DEMONSTRATION ** LAKE COUNTY PLANNING BD. POLSON		PETERSON, DONALD	80491401	NEW	77/11/15	\$19,550
	LAKE MARY RONAN RESTORATION					

GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT	AWARD
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PROJECT DIRECTOR /
FELLOW

TITLE

DATE OF
AWARD

TYPE OF GRANT

GRANT NO

AMOUNT UP
GRANT AWARD

NEGRASKA

★★ RESEARCH ★★

CREIGHTON UNIV.
UMMAH

WELLS, I. C.
OZONE EXPOSURE AND PULMONARY METABOLIC
EFFECTS OF MEDIATORS AND HORMONES

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APPLICANT	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MUNICIPALITY						
NEW HAMPSHIRE						
** RESEARCH **						
MANCHESTER, CITY OF MANCHESTER	INVESTIGATION OF A FLUID BED CARBON REGENERATION SYSTEM AT MANCHESTER NH	KITTMEDGE, D.	80537101	INCR	77/11/21	\$52,740

APPLICANT MUNICIPALITY	PROJECT DIRECTOR / FELLOW	GRANT NO.	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW JERSEY					
** RESEARCH ** EDGEWATER, BOROUGH OF EDGEWATER	COLLINS, DAVID P. UPGRADING PRIMARY TANKS WITH ROTATING BIOLOGICAL CONTACTORS	80485401	INCR	78/03/27	\$15,675
NEW JERSEY INST. OF TECH. FON. NEWARK	LISKOWITZ, J. REMOVAL & RECOVERY OF FLUOROBORATES FROM ELECTROPLATING WASTEWATER	80471001	INCR	78/01/20	\$4,507
PRINCETON UNIV. PRINCETON	ANTAL, M.J. PYROLYSIS OF AGRICULTURAL RESIDUES & FEEDLOT WASTES IN REACTIVE STEAM ATMOSPHERE	80483602	CONT	78/03/09	\$89,976
TEXTILE RES. INST. PRINCETON	MILLER, B. STUDIES OF DUST CAKE FORMATION & STRUCTURE IN FABRIC FILTRATION	80492602	CONT	77/12/20	\$64,996
** FELLOWSHIPS ** RUTGERS UNIV. NEWARK	FERRAIUOLO, R. M.S./PUBLIC ADMIN.-PART TIME	91101701	INCR	78/02/06	\$183

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK							
** RESEARCH **							
AMERICAN NATIONAL STANDARDS INST.	NEW YORK	SECRETARIAT ACTIVITIES OF INTERNATIONAL STANDARD ORGANIZATION	RESNICK, I	80570601	NEW	78/01/09	\$27,210
AMERICAN SOCIETY OF CIVIL ENGRS.	NEW YORK	DEVELOPMENT OF A TENTATIVE STANDARD FOR EVALUATING OXYGEN TRANSFER	MORGAN, R.	80586801	NEW	78/02/14	\$35,000
CORNELL UNIV.	ITHACA	AUTOMATED AERUBIC THERMOPHILIC DIGESTION WITH AIR AERATION	JEWELL, W.	80463602	CONT	77/11/21	\$114,455
CORNELL UNIV.	ITHACA	EFFECTIVENESS OF SOIL & WATER CONSERVATION PRACTICES FOR POLLUTION CONTROL	LOEMK, RAYMOND C.	80492501	INCR	78/03/31	\$10,293
GRUMMAN AEROSPACE CORP.	BETHPAGE	DEVELOPMENT OF REDUCED POLLUTION CORROSION PROTECTION SYSTEMS	STAEBLER, CHRISTIAN	80433101	INCR	78/01/19	\$62,000
MANHATTAN COLLEGE	BRONX	ANALYSIS OF NUTRIENT & TOXIC CHEMICAL FLUXES IN GREAT LAKES SEDIMENTS	DI TORO, D.	80522902	CONT	78/03/27	\$156,470
NEW YORK STATE DEPT. OF HEALTH	ALBANY	COMPARATIVE KINETIC STUDIES OF NUTRIENT UPTAKE & GROWTH IN THE GREAT LAKES PHYTOPLANKTON	PARMAN, T.	80468902	INCR	78/01/30	\$40,000
NEW YORK UNIV. MEDICAL CTR.	NEW YORK	HEMATOLOGIC & MUTAGENIC EFFECTS OF ARSINE	GOLDSTEIN, B.	80571101	NEW	78/03/09	\$35,550
RENSELAER POLYTECHNIC INST.	TRUY	ADAPTATION OF AQUATIC ECOSYSTEM MODEL FOR APPLIED USES	PARK, R. L.	80504701	INCR	78/01/16	\$7,600
				80504701	INCR	78/03/15	\$36,000

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **							
ST. LAWRENCE E. ONTARIO COMM.	MATERTOWN		TYSON, W. E.	80503101	INCR	78/02/24	887,597
		DAMAGE ASSESSMENT STUDIES FOLLOWING ALEXANDRIA BAY OIL SPILL					
SYRACUSE RES. CORP.	SYRACUSE		SAXENA, J.	80481302	CONT	77/12/27	873,532
		MUTAGENIC/CARCINOGENIC POTENTIAL OF MIXTURES OF ORGANIC SUBS. IN RENOVATED WATER					
SYRACUSE UNIV.	SYRACUSE		SMITH, J.	80377403	CONT	77/12/08	828,493
		QUANTITATION OF ADSORBED VIRUSES IN WASTE & OTHER WATER					
SYRACUSE UNIV.	SYRACUSE		JENNETT, J.C.	80473402	INCR	77/11/10	828,258
		EVALUATION OF ALGAL MEANDER SYSTEM AS A TECHNIQUE FOR ABATING POLLUTION FROM SECONDARY LEAD SMELTERS					
** TRAINING **							
CORNELL UNIV.	ITHACA		LOEHM, RAYMOND C.	90050002	INCR	78/03/15	867,079
		DEVELOPMENT OF COURSES IN LAND DISPOSAL OF WASTES					
NEW YORK STATE DEPT. OF ENVIRON. CONSERV	ALBANY		CAMPBELL, DANIEL J.	90054001	INCR	78/02/09	843,000
		DEMONSTRATION OF A TWO YEAR AAS WATER QUALITY MONITORING PROGRAM					
NYS DEPT OF ENVIRONMENTAL CONSERVATION	ALBANY		PETER AA BERLE, COMM.	00216201	NEW	78/02/00	829,932
		HANPOWER DEVELOPMENT & TRAINING					

NEW YORK

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NORTH CAROLINA						
** RESEARCH **						
DUKE UNIV. DURHAM		BUZZARD, G. H.	80301603	INCR	78/02/13	812,000
	DEVELOPMENT OF A TWO STAGE PARTICLE FRACTIONATOR BY FILTRATION THROUGH NUCLEOPORE SURFACES					
DUKE UNIV. BEAUFORT		SUTHERLAND, JOHN P.	80385603	CONT	77/12/05	870,000
	EFFECTS OF THERMAL ADDITIONS ON DYNAMICS OF FOULING COMMUNITIES AT BEAUFORT, NC					
DUKE UNIV. DURHAM		LOCHMULLEN, CHARLES	80549401	INCR	78/03/20	828,999
	STUDIES RELATED TO THE ORGANIC CHEMICAL ANALYSIS OF INDUSTRIAL SAMPLES					
DUKE UNIV. DURHAM		RIMER, A.	80581301	NEW	78/02/14	814,988
	UTILIZATION OF WRAP MODEL TO EVALUATE SOURCE SEPARATION					
NORTH CAROLINA STATE UNIV. RALEIGH		FERREL, JAMES K.	80481101	INCR	78/03/16	8141,891
	TEST & EVALUATION OF A PILOT PLANT COAL GASIFIER - GAS CLEANING FACILITY					
NORTH CAROLINA STATE UNIV. RALEIGH		MCKENZIE, M.	80573901	NEW	78/02/13	872,163
	CYTOLOGICAL EFFECTS OF HUMAN EXPOSURE TO POTENTIALLY MUTAGENIC ENVIRONMENTAL POLLUTANTS					
NORTH CAROLINA, UNIV. OF RALEIGH		HUMENIK, F. J.	80332803	INCR	78/01/20	846,570
	POLLUTION FROM RURAL LAND RUNOFF					
NORTH CAROLINA, UNIV. OF CHAPEL HILL		SOSBEY, M.	80421803	CONT	77/12/05	876,851
	EVALUATE TENTATIVE STANDARD METHODS FOR ENTERIC VIRUS CONCENTRATION & DETECTION IN DRINKING WATER					
NORTH CAROLINA, UNIV. OF RALEIGH		WEBER, A.	80427801	INCR	77/11/16	81,700
	ANALYSIS OF TOWER MEASUREMENTS OF TURBULENCE FOR NONUNIFORM FETCHES					
NORTH CAROLINA, UNIV. OF CHARLOTTE		COOKE, WILLIAM M.	80441301	INCR	78/03/20	825,000
	STUDY OF CONVERTER MATERIALS & ORGANIC NITROGEN INTERFERENCE IN NO-NO2 MONITORS					

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NORTH CAROLINA						
** RESEARCH ** NORTH CAROLINA, UNIV. OF CHAPEL HILL	PHOTOCHEMICAL STUDY OF NOX REMOVAL FROM STACK GASES	FOX, D.	80474002	CONT	77/11/23	839,023
NORTH CAROLINA, UNIV. OF CHAPEL HILL	ASSESSMENT & CONTROL OF WASTEWATER CONTAMINANTS ORIGINATING FROM PRODUCTION OF SYNTHETIC FUELS	SINGER, PHILIP C.	80491702	INCR	78/03/31	8149,429
NORTH CAROLINA, UNIV. OF CHAPEL HILL	CARBON MONOXIDE AND ACCELERATED ATHEROSCLEROSIS	BRINKHOUS, K. M.	80495902	CONT	77/11/21	8102,830
NORTH CAROLINA, UNIV. OF CHAPEL HILL	OUTDOOR SIMULATION OF AIR POLLUTION CONTROL	JEFFERIES, H.	80572601	NEW	76/01/30	990,000

APPLICANT MUNICIPALITY	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **					
AMERICAN INST. CHEMICAL ENGN. DAYTON	HOLINSKI, E. 5TH NATIONAL CONFERENCE ON ENERGY & THE ENVIRONMENT	80567501	NEW	78/03/15	\$8,000
BATTELLE MEMORIAL INST. COLUMBUS	SULLIVAN, R. COAL CLEANING-AN OPTION FOR INCREASED COAL UTILIZATION	80537401	INCR	78/02/17	\$8,565
CASE WESTERN RESERVE UNIV. CLEVELAND	LICK, W. DISPERSION & FATE OF CONTAMINANTS IN A STRATIFIED LAKE	80571601	NEW	78/01/05	\$184,400
CHRIST HOSPITAL INST. CINCINNATI	SCHIFF, G. UNIQUE APPROACH TO PROPAGATION OF NAV IN CELL CULTURE AND ANIMALS	80514402	CONT	78/03/29	\$107,532
CINCINNATI, CITY OF CINCINNATI	CLARK, C. EVALUATION OF THE HEALTH RISK ASSOC. WITH THE TREATMENT AND DISPOSAL OF MUN. WASTEWATER SLUDGE	80544501	NEW	78/01/10	\$178,587
CINCINNATI, UNIV. OF CINCINNATI	CLARK, C.S. HEALTH RISK OF HUMAN EXPOSURE TO WASTE-WATERS	80384303	CONT	78/03/27	\$331,216
CINCINNATI, UNIV. OF CINCINNATI	GARRETT, P. PROCESS AUTOMATION INVESTIGATIONS FOR ENVIRONMENTAL PROCESS CONTROL	80575801	NEW	78/02/14	\$39,380
CINCINNATI, UNIV. OF CINCINNATI	LOPEH, J. MUTAGENESIS AND CARCINOGENESIS CHARACTERIZATION OF ORGANICS IN DRINKING WATER	80557601	NEW	77/12/23	\$245,066
DAYTON, UNIV. OF DAYTON	HECHT, NORMAN L. INVESTIGATION OF CONCEPTS FOR IMPROVING THE FUEL FRACTION OF SHREDDED SOLID WASTE	80442101	INCR	77/12/12	\$66,595
NATIONAL WATER WELL ASSOC. NORTHINGTON	LEHR, J. FOURTH NATIONAL GROUNDWATER QUALITY SYMPOSIUM	80574701	NEW	78/01/16	\$42,822

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
OHIO AGRICULTURAL RES. DOOSTER	INTEGRATED PEST MGMT ON SELECTED GREENHOUSE VEGETABLE & FLORICULTURAL CROPS	LINDQUIST, R.	80557101	NEW	78/03/31	\$30,000
OHIO STATE UNIV. COLUMBUS	KINETIC STUDY OF SIMULATED SO ₂ NO _x , NH ₃ -POLLUTED ATMOSPHERES	GALVERT, J.	80434803	CONT	77/12/09	\$90,000
OHIO STATE UNIV. COLUMBUS	BIOLOGICAL ADEQUACY AND TOXICITY OF SELENIUM COMPOUND FROM FOOD AND WATER	COURT, D.	80548701	NEW	77/11/10	\$76,730
OHIO STATE UNIV. COLUMBUS	OHIO RIVER BASIN ENERGY STUDY PHASE 11	GORDAN, S.	80558901	INCR	77/11/15	\$30,000
OHIO STATE UNIV. RES. FDN. COLUMBUS	CRITICAL REVIEW OF VIRUS REMOVAL BY COAGULATION AND PH	SPROUL, O.	80577101	NEW	78/02/17	\$6,900
** DEMONSTRATION **						
FARM BUREAU DEVELOPMENT CORP. COLUMBUS	DEMONSTRATE TO MUNICIPALITIES & OHIO LANDOWNERS ACCEPTABLE SYSTEMS FOR APPLYING SLUDGE ON LAND	HILL, J. K.	80518901	INCR	78/02/27	\$300,000
** TRAINING **						
OHIO ENVIRONMENTAL COUNCIL COLUMBUS	CONFERENCE: HAZARDOUS WASTE MGMT. IN THE STATE OF OHIO	SATTERTHWAITE, S.	90078701	NEW	78/03/27	\$4,900
OHIO STATE UNIV. RES. FDN. COLUMBUS	INFORMATION COLLECTION, ANALYSIS & DISSEMINATION	HOWE, R.	90071001	INCR	77/11/22	\$11,381
** FELLOWSHIPS **						
CINCINNATI, UNIV. OF CINCINNATI	M.S./ENVIRON. ENGR.-FULLTIME	SHOEMAKER, JERRY L.	91108101	INCR	78/02/06	\$210

O H I O

APPLICANT MUNICIPALITY	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
O K L A H O M A					
** RESEARCH ** EAST CENTRAL OKLAHOMA STATE UNIV. ADA	ROME, M. DISSEMINATION OF INFORMATION CONCERNING ANIMAL PRODUCTION EFFECTS ON ENVIRONMENTAL QUALITY	80515102	CONT	78/02/06	\$47,002
LANGSTON UNIV. LANGSTON	FRANKS, M. RECLAMATION OF HEAVY-METAL CONTAMINATED SOILS	80432302	CONT	77/12/30	\$55,000
OKLAHOMA STATE DEPT. OF HEALTH OKLAHOMA CITY	HALL, DEMPSEY ADVANCED BIOLOGICAL TREATMENT (AQUACULTURE) OF MUNICIPAL WASTEWATERS	80370301	INCR	78/03/15	\$80,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
O R E G O N						
** RESEARCH ** OREGON STATE UNIV. CORVALLIS		HOGG, T. LAKE VANCOUVER WASHINGTON SOCIAL IMPLICATION OF LAKE RESTORATION PROGRAM	80551001	INCR	78/01/05	\$5,639
OREGON STATE UNIV. CORVALLIS		BUHLER, D. AVAILABILITY OF CADMIUM TO RATS FROM CROPS GROWN ON CADMIUM ENRICHED SOILS	80577401	NEW	78/02/06	\$95,947
OREGON STATE UNIV. CORVALLIS		GIBBS, K. ECONOMIC IMPACT OF LAKE RESTORATION	80586101	NEW	78/03/09	\$100,000
PORTLAND STATE UNIV. PORTLAND		O'BRIEN, R. INVESTIGATION OF AROMATIC HYDROCARBONS IN PHOTOCHEMICAL AIR POLLUTION	80476402	CONT	77/11/15	\$50,000

APPLICANT MUNICIPALITY	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
P E N N S Y L V A N I A					
** RESEARCH ** DREXEL UNIV. PHILADELPHIA	KOERNER, R. M. MICROWAVE SYSTEM FOR LOCATING FAULTS IN HAZARDOUS MATERIAL DIKES; PARAMETER SPECIFICATION	80476301	INCR	78/01/19	\$50,900
FRANKLIN INST. PHILADELPHIA	KUTCHEN, J. PREPARATION OF MTE INDUSTRIAL TECHNOLOGY BULLETIN VOL 5 & INPUT TO WRSIC DATA SERVICE	80560001	NEW	77/12/05	\$55,523
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	RISBY, TERENCE CHEMICAL IONIZATION MASS SPECTROMETRY OF ORGANICS & ORGANOMETALLIC COMPOUNDS	80365102	INCR	78/01/19	\$51,505
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	PANOFKY ASPECTS OF MODELLING URBAN AIR QUALITY	80564001	NEW	78/01/30	\$46,260
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	ATHES, R. METEOROLOGICAL MODELS FOR AIR QUALITY STUDIES	80565901	NEW	77/12/29	\$87,068
PITTSBURGH, UNIV. OF PITTSBURG	SHAPIRO, M. OHIO RIVER BASIN ENERGY STUDY PHASE II	80560801	INCR	77/11/23	\$80,000
PITTSBURGH, UNIV. OF PITTSBURG	SYKORA, J. ISOLATION, ANALYSIS & TOXICITY OF ALGAL & BACTERIAL ENDOOTOXINS	80575401	NEW	78/01/10	\$78,160
** DEMONSTRATION ** PENNSYLVANIA DEPT. ENV. RES. HARRISBURG	FRIEDRICH, A. TIOGA RIVER DEMONSTRATION PROJECT	80578401	INCR	77/12/29	\$1,085
** TRAINING ** AMERICAN LAW INST./AMERICAN BAR ASSOC. PHILADELPHIA	MACLAY, D. SUPPORT OF PUBLIC INTEREST ENVIRON. LAWYERS FOR TRAINING IN ENVIRON. LAW	90078101	NEW	78/02/01	\$25,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
P E N N S Y L V A N I A						
** TRAINING ** PENNSYLVANIA DEPT OF COMMUNITY AFFAIRS HARRISBURG		WILLIAM H. WILCOX WATER POLLUTION CONTROL TRAINING	00310603	CONT	77/10/05	\$10,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
SOUTH CAROLINA						
** RESEARCH ** CLEMSON UNIV. CLEMSON		GADDIS, J. HYPERFILTRATION FOR SEPARATION OF TOXICS IN TEXTILE PROCESS WATER	80577701	NEW	76/01/09	\$64,820
** FELLOWSHIPS ** SOUTH CAROLINA, UNIV. OF COLUMBIA		M.S./ENGM. PEARSON, OTTO E.	91072401	INCR	76/02/14	590

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **	SOUTH DAKOTA STATE UNIV. BROOKINGS	SOUTH DAKOTA					
		INFILTRATION LAND TREATMENT OF STABILIZATION POND EFFLUENT	DORNBUSH, J.	80380402	INCR	78/03/15	\$41,020

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT UP GRANT AWARD
T E N N E S S E E						
** RESEARCH ** VANDERBILT UNIV. NASHVILLE	BOOK ON TOXICOLOGY OF PESTICIDES	MAYER, W.	80488502	CONT	77/10/25	\$70,000
** TRAINING ** VANDERBILT UNIV. NASHVILLE	FORMAL INSTR & PRACTICAL EXERCISES PERSONAL SAFETY & ON-SCENE COORDINATION HAZARDOUS MATERIALS SPILL	ROTH, J. A.	90063401	INCR	78/01/25	\$7,574

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
T E X A S						
** RESEARCH ** NORTH TEXAS STATE UNIV. DENTON		GLAZE, W. AN OPTIMIZATION OF THE LLE METHOD FOR THE ANALYSIS OF VOLATILE HALIDES IN DRINKING WATER	80547201	NEW	77/10/25	853,113
TEXAS A&M RES. FDN. COLLEGE STATION		IRGOLIC, K. SPECIATION OF ARSENIC IN WATER SUPPLIES	80477402	CONT	77/10/27	852,351
TEXAS A&M RES. FDN. COLLEGE STATION		BRIGHT, T. EFFECTS OF DRILLING FLUIDS AND OIL IN CORALS OCCUPYING HARD BANK COMMUNITIES	80544101	INCR	77/10/27	82,007
TEXAS A&M RES. FDN. COLLEGE STATION		SUMMERS, M. BACULOVIRUS PESTICIDES: IDENTIFICATION OF MARKERS FOR GENETIC STUDIES	80594701	NEW	78/02/24	885,000
TEXAS SOUTHERN UNIV. HOUSTON		WILSON, R. LOW TEMP. CONDENSERS IN DETERMINATION OF CDU	80577201	NEW	78/03/27	330,717
TEXAS, UNIV. OF AUSTIN		HIMMELBLAU, D. REACTIONS OF SULFUR DIOXIDE IN AEROSOLS	80381403	CONT	78/02/07	850,000
TEXAS, UNIV. OF AUSTIN		GIBSON, D. BIODEGRADATION OF CHLORINATED DIBENZOFURANS & DIBENZODIOXINS	80452502	CONT	77/12/05	328,000
** DEMONSTRATION ** GUADALUPE BLANCO RIVER AUTH. SEGUIN		SPECHT, J. LAKE MCQUEENEY LAKE RESTORATION PROJECT	80550401	NEW	77/11/15	8120,000
** TRAINING ** RICE UNIV. HOUSTON		WARD, C. M. TRAINING IN WATER SUPPLY & POLLUTION CONTROL	90017507	INCR	78/01/10	8211,537

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
V I R G I N I A						
** RESEARCH ** NORFOLK STATE COLLEGE NORFOLK		GEORGE, A. PHOTON CORRELATION LASER DOPPLER SPECTROSCOPY IN-SITU DETERMINATION SIZE SOURCE EMISSION	80376502	INCR	76/02/06	\$6,345
VIRGINIA POLYTECHNIC INST. & STATE UNIV. BLACKSBURG		MOHN, R. C. PARAMETRIC ASSESSMENT & OPTIMIZATION OF VOLATILE ORGANIC ANALYSIS METHODS	80486401	INCR	78/02/27	\$24,509
VIRGINIA, MEDICAL COLLEGE OF RICHMOND		BORZELLECA, J. EXCRETION OF PESTICIDES IN SALIVA	80431803	CONT	77/12/30	\$54,846
WILLIAM & MARY COLLEGE WILLIAMSBURG		TYREE, S. Y. STANDARDS FOR & METHODS OF ANALYSIS OF RAINFALL FOR ACIDITY	80499801	INCR	77/12/30	\$11,470
** TRAINING ** IZAAK WALTON LEAGUE OF AMERICA ARLINGTON		LORENZ, J. MUNICIPAL SLUDGE & RESOURCE CONSERVATION & RECOVERY ACT	90075401	NEW	77/12/29	\$58,822
VA STATE WATER CONTROL BD RICHMOND		THOMAS M PETTY TNG WW1 PLANT OPERATORS	00311003	CONT	77/10/05	\$10,000
** FELLOWSHIPS ** VIRGINIA COMMONWEALTH UNIV. RICHMOND		MACE, W. B. S./COMPUTER SCIENCE	91106201	INCR	78/01/19	\$24
VIRGINIA COMMONWEALTH UNIV. RICHMOND		FORTNER, LIMON E. CERTIFICATION IN INFO. SYS.	91107501	INCR	78/01/19	\$24

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W A S H I N G T O N						
** RESEARCH ** VIRGINIA MASON RESEARCH CTR. SEATTLE		D'Aoust, Brian G. CONTINUOUS MONITORING OF TOTAL DISSOLVED GAS PRESSURE	80417502	INCR	78/02/27	\$36,012
WASHINGTON STATE UNIV. PULLMAN		CROWN, D. MEASUREMENT OF TROPOSPHERIC HALOCARBONS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY	80403303	INCR	77/12/12	\$39,870
WASHINGTON STATE UNIV. PULLMAN		COOK, J. OPTIMIZATION AND TESTING OF HIGHWAY MATERIALS TO MITIGATE ICE ADHESION	80466001	INCR	77/11/21	\$24,877
WASHINGTON STATE UNIV. PULLMAN		FUNK, M. EFFECTS OF LAKE RESTORATION UPON LIBERTY LAKE, WAEFFECTS OF LAKE RESTORATION UPON LIBERTY LAKE WASH	80560401	NEW	78/01/06	\$170,806
WASHINGTON, UNIV. OF SEATTLE		PILAT, M.J. PLUME OPACITY RELATED TO PARTICLE SIZE AND CHEMICAL COMPOSITION	80369703	CONT	77/12/14	\$40,000
WASHINGTON, UNIV. OF SEATTLE		DEWALLE, F. ANALYTICAL METHODS EVALUATION FOR APPLICABILITY IN LEACHATE ANALYSIS	80575301	NEW	78/03/20	\$16,000
** DEMONSTRATION ** LONGVIEW, CITY OF LONGVIEW		LLOYD INMAN LAKE SACAJAWEE REHABILITATION.	80526401	NEW	78/01/06	\$1,717,562
MEDICAL LAKE, TOWN OF MEDICAL LAKE		GILBETH, F. RESTORATION ANALYSIS & REHABILITATION OF MEDICAL LAKE	80472801	INCR	78/02/24	\$25,328
MOUNTLAKE TERRACE, CITY OF MOUNTLAKE TERRAC		WHITE, R. LAKE BALLINGER RESTORATION PROJECT	80577601	NEW	78/03/31	\$429,323

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
WEST VIRGINIA						
** RESEARCH ** WEST VIRGINIA UNIV. MORGANTOWN		ELI, R. CALIBRATION OF 90 - NOTCH WEIRS USING PARAMETERS OTHER THAN WEIR HEAD	80531201	INCR	77/12/14	\$1,680
WEST VIRGINIA UNIV. MORGANTOWN		CARDI, V. OHIO RIVER BASIN ENERGY STUDY	80558501	INCR	77/12/14	\$100,000
** TRAINING ** WEST VIRGINIA DEPT OF HEALTH CHARLESTON		HERBERT L. TURNER TREATMENT OPERATOR TRAINING	00313301	NEW	77/10/05	\$7,000

APPLICANT	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MUNICIPALITY	TITLE				
* I S C O N S I N					
** RESEARCH **					
OASIS 2000 INC. RICE LAKE	ROLAND M. BROWNLEE ENERGY AND ECONOMIC ASSESSMENT OF ANAEROBIC DEGESTERS AND BIOFUELS FOR RURAL WASTE MANAGEMENT	80445701	INCR	76/01/09	\$24,540
WISCONSIN, UNIV. OF MADISON	CLIVER, D. INFECTIVITY & PATHOGENICITY OF ENTEROVIRUSES INGESTED WITH DRINKING WATER	80398602	INCR	77/11/10	\$57,740
WISCONSIN, UNIV. OF MADISON	D'ALESSIO, D. HUMAN HEALTH HAZARDS OF VIRUSES IN DRINKING & REC. WATERS	80416103	CONT	76/02/24	\$120,040
WISCONSIN, UNIV. OF MADISON	BLAEDEL, W. ION EXCHANGE MEMBRANES FOR SAMPLING & SPECIATION IN WATER ANALYSIS	80417903	CONT	76/01/05	\$34,500
WISCONSIN, UNIV. OF MADISON	COREY, R. B. HEAVY METAL BIOAVAILABILITY IN SLUDGE AMENDED SOILS	80461401	INCR	77/12/19	\$11,135
WISCONSIN, UNIV. OF MADISON	LICHTENSTEIN, E. ECOLOGICAL-BIOLOGICAL EFFECTS AND INTERACTIONS OF PESTICIDES IN A SOIL-PLANT-WATER MICROCOSM	80492002	CONT	77/10/25	\$79,895
WISCONSIN, UNIV. OF MADISON	JOHN J. MAGNUSON DETERMINATION OF THERMAL PREFERENCE OF THREE GENETIC STOCKS OF LARGemouth BASS	80556301	NEW	78/01/30	\$7,468
** DEMONSTRATION **					
INLAND LAKE RENAIWAL MADISON	EARL, A. LAKE HENRY PROTECTION REHABILITATION PROJECT	80476501	INCR	77/11/21	\$40,000
WISCONSIN DEPT. OF NATURAL RESOURCES MADISON	KARL, A. S. LAKE KNUQUEWAY PROTECTION AND REHABILITATION PROJECT	80476801	INCR	78/02/17	\$40,000

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT UP GRANT AWARD
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W Y O M I N G

** RESEARCH **
WYOMING, UNIV. OF
LARAMIE

RECHARD, P.	80518502	CONT	78/03/20	\$184,000
IMPORTANCE AND FUNCTIONS OF ALLUVIAL VALLEY FLOODS				

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT UP GRANT AWARDED
** RESEARCH **	INTERNATIONAL CUMM. RADIOLOGICAL PROT. SUNREY	SONBY, F.	80571501	NEW	78/02/14	85,000

FOREIGN COUNTRIES
ENGLAND

APPLICANT	MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
F O R E I G N C O U N T R I E S							
ISRAEL							
** RESEARCH **	HEBREW UNIV. JERUSALEM	DEVELOPMENT OF METHODS FOR THE DETECTION & INACTIVATION OF VIRUSES IN VARIOUS WATERS	SHUVAL, M. I.	80351003	INCR	76/01/30	\$48,600
	HEBREW UNIV. JERUSALEM	EPIDEMIOLOGICAL STUDY OF DISEASE ASSOCIATED WITH WASTEWATER SPRINKLER IRRIGATION	SHUVAL, M.	80517401	INCR	77/12/01	\$33,049

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
F O R E I G N C O U N T R I E S						
YUGOSLAVIA						
** RESEARCH ** INSTITUTE FOR MEDICAL RES. ZAGREB	EFFECT OF ENVIRON. POLLUTANTS IN RELATION TO AGE & DIETARY INFLUENCES ¹¹ . TOXIC TRACE ELEMENTS	KOSTIAL, K.	8046H101	INCR	78/03/16	\$101,000

SECTION II

GRANT NUMBER	STATE	PROGRAM	APPLICANT
800188-032	LA	RESEARCH	LOUISIANA STATE UNIV. & ASM COLLEGE
800690-181	CA	RESEARCH	CALIFORNIA, UNIV. OF
803018-033	NC	RESEARCH	DUKE UNIV.
803089-016	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
803328-032	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
803360-030	MA	RESEARCH	HARVARD COLLEGE
803396-015	CA	DEMONSTRATION	MOUNTAIN VIEW, CITY OF
803399-032	MI	RESEARCH	MICHIGAN, UNIV. OF
803510-031	FC	RESEARCH	HEBREW UNIV.
803643-030	OH	RESEARCH	CINCINNATI, UNIV. OF
803651-025	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
803694-022	CO	RESEARCH	COLORADO STATE UNIV.
803703-014	OK	RESEARCH	OKLAHOMA STATE DEPT. OF HEALTH
803715-023	AZ	RESEARCH	ARIZONA, UNIV. OF
803765-021	VA	RESEARCH	NORFOLK STATE COLLEGE
803774-030	NY	RESEARCH	SYRACUSE UNIV.
803802-030	CA	RESEARCH	STANFORD RES. INST.
803804-023	SD	RESEARCH	SOUTH DAKOTA STATE UNIV.
803814-030	TX	RESEARCH	TEXAS, UNIV. OF
803851-032	MI	RESEARCH	MINNESOTA, UNIV. OF
803856-030	NC	RESEARCH	DUKE UNIV.
803880-013	DC	RESEARCH	ENVIRONMENTAL LAW INST.
803896-022	MO	RESEARCH	WASHINGTON UNIV.
803897-030	WA	RESEARCH	WASHINGTON, UNIV. OF
803903-030	IA	RESEARCH	AMES, CITY OF
803933-020	AL	RESEARCH	ALABAMA A&M UNIV.
803953-022	GA	RESEARCH	GEORGIA INST. OF TECH.
803968-030	CO	RESEARCH	COLORADO, UNIV. OF
803968-031	CU	RESEARCH	COLORADO, UNIV. OF
803983-030	HI	RESEARCH	HAWAII, UNIV. OF
803983-031	HI	RESEARCH	HAWAII, UNIV. OF
803986-021	WI	RESEARCH	WISCONSIN, UNIV. OF
804033-032	WA	RESEARCH	WASHINGTON STATE UNIV.
804102-023	IA	RESEARCH	IOWA STATE UNIV.
804155-030	GA	RESEARCH	GEORGIA, UNIV. OF
804161-030	WI	RESEARCH	WISCONSIN, UNIV. OF
804162-013	CO	RESEARCH	COLORADO SCH. OF MINES RES. INST.
804174-021	MI	DEMONSTRATION	FORD MOTOR CO.
804175-021	VA	RESEARCH	VIRGINIA MASON RESEARCH CTR.
804179-030	WI	RESEARCH	WISCONSIN, UNIV. OF
804191-014	FL	DEMONSTRATION	FLORIDA GAME & FRESH WATER FISH COMM.
804218-030	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804274-012	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804318-030	VA	RESEARCH	VIRGINIA, MEDICAL COLLEGE OF
804323-020	OK	RESEARCH	LANGSTON UNIV.
804331-012	NY	RESEARCH	GRUMMAN AEROSPACE CORP.
804345-030	CA	RESEARCH	CALIFORNIA, UNIV. OF
804348-030	OH	RESEARCH	OHIO STATE UNIV.
804350-014	MA	RESEARCH	W.R. GRACE & CO.
804351-030	AZ	DEMONSTRATION	ARIZONA, UNIV. OF
804353-030	FL	RESEARCH	MIAMI, UNIV. OF
804375-022	FL	RESEARCH	FLORIDA STATE EPIDEMIOLOGY RES. CTR.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804385-014	DC	RESEARCH	PUBLIC TECHNOLOGY, INC.
804403-030	IL	RESEARCH	ILLINOIS, UNIV. OF
804413-013	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804421-011	OH	RESEARCH	DAYTON, UNIV. OF
804442-021	MI	RESEARCH	CRANBROOK INST. OF SCIENCE
804442-030	MI	RESEARCH	CRANBROOK INST. OF SCI.
804444-030	MO	RESEARCH	MISSOURI, UNIV. OF
804457-012	WI	RESEARCH	OASIS 2000 INC.
804458-020	FL	RESEARCH	WEST FLORIDA, UNIV. OF
804469-013	DC	RESEARCH	ENVIRONMENTAL LAW INST.
804501-012	MN	RESEARCH	MINNESOTA, UNIV. OF
804525-020	TX	RESEARCH	TEXAS, UNIV. OF
804527-014	MI	RESEARCH	SOUTHERN MISSISSIPPI, UNIV. OF
804533-021	IA	RESEARCH	IOWA STATE UNIV
804536-016	DC	RESEARCH	SMITHSONIAN INST.
804547-021	TN	RESEARCH	PURDUE UNIV.
804554-013	MA	RESEARCH	ARTHUR D. LITTLE, INC.
804568-021	KY	RESEARCH	KENTUCKY, UNIV. OF
804571-014	LA	RESEARCH	JEFFERSON PARISH
804578-013	MA	RESEARCH	NORTHEASTERN UNIV.
804585-020	NE	RESEARCH	CREIGHTON UNIV.
804610-012	WI	RESEARCH	WISCONSIN, UNIV. OF
804630-020	NY	RESEARCH	CORNELL UNIV.
804641-011	FC	RESEARCH	INSTITUTE FOR MEDICAL RES.
804660-012	WA	RESEARCH	WASHINGTON STATE UNIV.
804664-014	IL	RESEARCH	ILLINOIS, UNIV. OF
804689-021	NY	RESEARCH	NEW YORK STATE DEPT. OF HEALTH
804700-021	MA	RESEARCH	HARVARD COLLEGE
804707-011	MN	DEMONSTRATION	HENNEPIN CNTY. PARK RESERVE DIST.
804709-011	CA	RESEARCH	SOUTHERN CALIFORNIA METRO WATER DIST.
804710-014	NJ	RESEARCH	NEW JERSEY INST. OF TECH. FDN.
804724-020	MA	RESEARCH	SALEM & BEVERLY WATER SUPPLY BOARD
804728-012	WA	DEMONSTRATION	MEDICAL LAKE, TOWN OF
804734-021	NY	RESEARCH	SYRACUSE UNIV.
804740-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804748-020	AL	RESEARCH	ALABAMA, UNIV. OF
804763-014	PA	RESEARCH	DREXEL UNIV.
804764-020	OR	RESEARCH	PORTLAND STATE UNIV.
804765-012	WI	DEMONSTRATION	INLAND LAKE RENAISSANCE
804768-012	WI	DEMONSTRATION	WISCONSIN DEPT. OF NATURAL RESOURCES
804774-020	TX	RESEARCH	TEXAS A&M RES. FDN.
804811-012	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
804813-020	NY	RESEARCH	SYRACUSE RES. CORP.
804815-013	FL	DEMONSTRATION	FLORIDA DEPT. OF ENVIRON. REGULATION
804819-014	DC	DEMONSTRATION	PUBLIC INTEREST ECONOMICS CENTER
804834-020	MI	RESEARCH	MICHIGAN, UNIV. OF
804836-020	NJ	RESEARCH	PRINCETON UNIV.
804854-013	NJ	RESEARCH	EDGEWATER, BOROUGH OF
804864-012	VA	RESEARCH	VIRGINIA POLYTECHNIC INST. & STATE UNIV.
804885-020	TN	RESEARCH	VANDERBILT UNIV.
804895-011	CA	DEMONSTRATION	EAST BAY MUN. UTIL. DIST.
804902-011	TN	RESEARCH	EVANSVILLE, CITY OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804914-010	WI	DEMONSTRATION	LAKE COUNTY PLANNING BD.
804916-020	FL	RESEARCH	FLORIDA ST. UNIV.
804917-021	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804920-020	WI	RESEARCH	WISCONSIN, UNIV. OF
804925-011	NY	RESEARCH	CORNELL UNIV.
804926-020	NJ	RESEARCH	TEXTILE RES. INST.
804926-011	MA	RESEARCH	MARLBOROUGH, CITY OF
804959-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804972-020	KY	RESEARCH	INTERSTATE MINING COMPACT COMM.
804986-021	WI	RESEARCH	MINNESOTA, UNIV. OF
804988-013	VA	RESEARCH	WILLIAM & MARY COLLEGE
805016-012	CA	RESEARCH	STANFORD UNIV.
805029-010	MA	DEMONSTRATION	MASSACHUSETTS METROPOLITAN DIST. COMM.
805031-013	NY	RESEARCH	ST. LAWRENCE E. ONTARIO COMM.
805036-011	MA	RESEARCH	META SYSTEMS INC.
805047-013	NY	RESEARCH	RENSELAER POLYTECHNIC INST.
805047-014	NY	RESEARCH	RENSELAER POLYTECHNIC INST.
805091-020	MA	RESEARCH	HARVARD UNIV.
805102-020	DE	RESEARCH	DELAWARE, UNIV. OF
805125-020	MI	RESEARCH	MICHIGAN, UNIV. OF
805126-011	WI	RESEARCH	MINNESOTA, UNIV. OF
805144-020	OH	RESEARCH	CHRIST HOSPITAL INST.
805146-020	MI	RESEARCH	MICHIGAN, UNIV. OF
805151-020	OK	RESEARCH	MICHIGAN, UNIV. OF
805165-020	MA	RESEARCH	EAST CENTRAL OKLAHOMA STATE UNIV.
805174-012	FC	RESEARCH	MASSACHUSETTS UNIV. MEDICAL SCHOOL
805185-020	WY	RESEARCH	HERREN UNIV.
805189-011	OH	RESEARCH	WYOMING, UNIV. OF
805215-011	CO	DEMONSTRATION	FARM BUREAU DEVELOPMENT CORP.
805223-011	MI	RESEARCH	COLORADO STATE UNIV.
805228-020	AZ	RESEARCH	HAZARDOUS MATERIAL CONTROL RES.
805229-020	NY	RESEARCH	ARIZONA, UNIV. OF
805231-010	MS	RESEARCH	MANHATTAN COLLEGE
805264-010	WA	DEMONSTRATION	MISSISSIPPI STATE UNIV.
805279-011	CA	RESEARCH	LONGVIEW, CITY OF
805284-010	MO	RESEARCH	MULTON NIGUEL WATER DIST.
805288-012	FL	DEMONSTRATION	MISSOURI DEPT. OF NATURAL RESOURCES
805295-010	MO	RESEARCH	FLORIDA STATE UNIV.
805310-010	MO	DEMONSTRATION	VANDALIA, CITY OF
805312-011	WV	RESEARCH	MOBERLY, CITY OF
805333-011	MI	RESEARCH	WEST VIRGINIA UNIV.
805366-012	FL	RESEARCH	MICHIGAN, UNIV. OF
805371-011	NH	RESEARCH	WEST FLORIDA, UNIV. OF
805374-012	NY	RESEARCH	MANCHESTER, CITY OF
805383-011	MT	RESEARCH	RATTELLE MEMORIAL INST.
805410-013	CA	RESEARCH	MONTANA STATE UNIV.
805428-012	HN	RESEARCH	CALIFORNIA, UNIV. OF
805441-011	TX	RESEARCH	MINNESOTA STATE DEPT OF HEALTH
805445-010	OH	RESEARCH	TEXAS A&M RES. FDN.
805458-010	CT	RESEARCH	CINCINNATI, CITY OF
805472-010	TX	RESEARCH	VALE UNIV.
805487-010	OH	RESEARCH	NORTH TEXAS STATE UNIV.
			OHIO STATE UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805493-013	MA	RESEARCH	NEW ENGLAND FISHERIES STEERING COMM.
805494-011	NC	RESEARCH	DUKE UNIV.
805504-010	TX	RESEARCH	GUADALUPE BLANCO RIVER AUTH.
805510-012	OR	DEMONSTRATION	OREGON STATE UNIV.
805511-011	CA	RESEARCH	CONTRA COSTA CNTY. HEALTH DEPT.
805565-010	MI	RESEARCH	MICHIGAN TECH. UNIV.
805568-010	IA	DEMONSTRATION	IOWA STATE CONSERVATION COMM.
805569-012	KY	RESEARCH	LOUISVILLE, UNIV. OF
805571-010	OH	RESEARCH	OHIO AGRICULTURAL RES.
805576-010	OH	RESEARCH	CINCINNATI, UNIV. OF
805581-011	CA	RESEARCH	OCCIDENTAL COLLEGE
805583-010	WI	RESEARCH	WISCONSIN, UNIV. OF
805585-012	WV	RESEARCH	WEST VIRGINIA UNIV.
805587-012	IL	RESEARCH	ILLINOIS, UNIV. OF
805588-012	IL	RESEARCH	ILLINOIS, UNIV. OF
805589-011	OH	RESEARCH	OHIO STATE UNIV.
805590-012	KY	RESEARCH	KENTUCKY, UNIV. OF
805596-010	MO	RESEARCH	MIDWEST RES. INST.
805600-010	PA	RESEARCH	FRANKLIN INST.
805603-011	IN	RESEARCH	PURDUE RES. FDN.
805604-010	WA	RESEARCH	WASHINGTON STATE UNIV.
805608-012	PA	RESEARCH	PITTSBURGH, UNIV. OF
805609-011	IN	RESEARCH	INDIANA UNIV.
805610-010	MT	RESEARCH	MONTANA, UNIV. OF
805612-010	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
805617-010	AL	RESEARCH	ALABAMA, UNIV. OF
805628-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805629-012	IL	RESEARCH	CHICAGO METRO. SAN. DIST.
805635-010	AZ	RESEARCH	ARIZONA, UNIV. OF
805640-010	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
805650-010	CA	RESEARCH	ATMOSPHERIC RES. GROUP
805654-010	MA	RESEARCH	NEW ENGLAND AQUARIUM
805659-010	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
805660-011	AK	RESEARCH	EMMONAK, CITY OF
805661-011	AK	RESEARCH	WAINWRIGHT, CITY OF
805672-010	CA	RESEARCH	LAFAVETTE, CITY OF
805675-010	OH	RESEARCH	AMERICAN INST. CHEMICAL ENGR.
805676-010	MN	RESEARCH	MINNESOTA, UNIV. OF
805680-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805681-010	MN	RESEARCH	RAISEY CNTY.
805706-010	NY	RESEARCH	AMERICAN NATIONAL STANDARDS INST.
805711-010	NY	RESEARCH	NEW YORK UNIV. MEDICAL CTR.
805715-010	FC	RESEARCH	INTERNATIONAL COMM. RADIOLOGICAL PROT.
805716-010	OH	RESEARCH	CASE WESTERN RESERVE UNIV.
805721-010	MI	RESEARCH	MICHIGAN, UNIV. OF
805725-010	CO	RESEARCH	DENVER, UNIV. OF
805726-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
805731-010	AZ	RESEARCH	ARIZONA, UNIV. OF
805733-010	CO	RESEARCH	DENVER, UNIV. OF
805739-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
805747-010	PH	RESEARCH	NATIONAL WATER WELL ASSOC.
805753-010	MA	RESEARCH	WASHINGTON, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805753-010	PA	RESEARCH	PITTSBURGH, UNIV. OF
805758-010	OH	RESEARCH	CINCINNATI, UNIV. OF
805759-010	CJ	RESEARCH	COLORADO STATE UNIV.
805771-010	OH	RESEARCH	OHIO STATE UNIV. RES. FDN.
805772-010	TX	RESEARCH	TEXAS SOUTHERN UNIV.
805774-010	OR	RESEARCH	OREGON STATE UNIV.
805776-010	WA	DEMONSTRATION	MOUNTLAKE TERRACE, CITY OF
805777-010	SC	RESEARCH	CLEMSON UNIV.
805784-010	PA	DEMONSTRATION	PENNSYLVANIA DEPT. ENV. RES.
805788-010	CA	RESEARCH	JOHN MUIR INST. FOR ENVRN. STUDIES
805795-010	WA	RESEARCH	BOSTON, CITY OF
805796-010	MI	DEMONSTRATION	MICHIGAN, UNIV. OF
805799-010	NC	RESEARCH	ENVIRONMENTAL LAW INST.
805800-010	MD	RESEARCH	JOHN HOPKINS UNIV.
805803-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805811-010	CJ	RESEARCH	COLORADO STATE UNIV.
805813-010	NC	RESEARCH	DUKE UNIV.
805826-010	TA	RESEARCH	IOWA STATE UNIV.
805833-010	GA	RESEARCH	GEORGIA, UNIV. OF
805861-010	OR	RESEARCH	OREGON STATE UNIV.
805864-010	TL	RESEARCH	IIT RESEARCH INST.
805868-010	NY	RESEARCH	AMERICAN SOCIETY OF CIVIL ENGRS.
805947-010	TX	RESEARCH	TEXAS A&M RES. FDN.
900175-079	TX	TRAINING	RICE UNIV.
900500-024	NY	TRAINING	CORNELL UNIV.
900500-016	NY	TRAINING	NEW YORK STATE DEPT. OF ENVRN. CONSERV
900570-014	DC	TRAINING	NATIONAL ASSOC. OF COUNTIES
900593-021	CA	TRAINING	SOUTHERN CALIFORNIA, UNIV. OF
900607-014	DC	TRAINING	LEAGUE OF CITIES-CONFERENCE OF MAYORS
900629-020	DC	TRAINING	CONSERVATION FDN.
900632-011	CJ	TRAINING	AMERICAN WATER WORKS ASSOC.
900634-013	TN	TRAINING	VANDERBILT UNIV.
900641-012	DC	TRAINING	NATIONAL WILDLIFE FED.
900657-012	DC	TRAINING	NATIONAL ASSOC. OF COUNTIES RES. FDN.
900662-011	TL	TRAINING	AMERICAN PUBLIC WORKS ASSOC.
900685-020	DC	TRAINING	LEAGUE OF WOMEN VOTERS EDUC. FUND
900690-012	CA	TRAINING	CALIFORNIA STATE UNIV.
900702-011	MD	TRAINING	WATER WASTEWATER TECH. SCH.
900710-011	OH	TRAINING	OHIO STATE UNIV. RES. FDN.
900715-011	NC	TRAINING	LEAGUE OF WOMEN VOTERS EDUCATION FUND
900721-012	DC	TRAINING	ENVRN. ACTION FDN.
900744-011	DC	TRAINING	NATIONAL ASSOC. OF CONSERVATION DIST.
900749-011	NC	TRAINING	AMERICAN INST. HUM. RES. EDUC. & TRAINING
900750-010	NC	TRAINING	NATIONAL LEAGUE OF CITIES
900750-010	VA	TRAINING	IZAAK WALTON LEAGUE OF AMERICA
900757-012	DC	TRAINING	NATIONAL ASSOC. OF COUNTRIES RES. FDN.
900760-010	DC	TRAINING	PUBLIC TECHNOLOGY, INC.
900768-010	DC	TRAINING	AMERICAN PUBLIC HEALTH ASSOC.
900770-010	DC	TRAINING	TECHNICAL INFORMATION PROJECT
900772-010	MI	TRAINING	MICHIGAN, WEST, ENV. ACT. ED. FDN.
900773-010	DC	TRAINING	NATIONAL WILDLIFE FEDER.
900775-010	VA	TRAINING	VIRGINIA ST. AIR POLL. CONT. BD.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
900776-010	MA	TRAINING	CHILDREN'S MUSEUM
900777-010	DC	TRAINING	ENVIRONMENTAL ACTION FDN.
900778-010	DC	TRAINING	NATIONAL ASSOC. OF REG. COUNCILS
900781-010	PA	TRAINING	AMERICAN LAW INST./AMERICAN BAR ASSOC.
900783-010	IL	TRAINING	SOUTHERN ILLINOIS UNIV.
900784-010	CA	TRAINING	SIERRA CLUB
900785-010	DC	TRAINING	NATIONAL ASSOC. OF REGIONAL COUNCILS
900787-010	NH	TRAINING	OHIO ENVIRONMENTAL COUNCIL
900788-010	DC	TRAINING	INTERNATIONAL CITY MGMT. ASSOC.
900810-010	CA	TRAINING	ASSOCIATION OF BAY AREA GOVTS.
910724-012	SC	TRAINING	SOUTH CAROLINA, UNIV. OF
910791-011	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910990-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
911017-011	NJ	FELLOWSHIPS	RUTGERS UNIV.
911040-011	WN	FELLOWSHIPS	MINNESOTA, UNIV. OF
911062-011	VA	FELLOWSHIPS	VIRGINIA COMMONWEALTH UNIV.
911068-011	CA	FELLOWSHIPS	CONTROL DATA INST.
911075-011	VA	FELLOWSHIPS	VIRGINIA COMMONWEALTH UNIV.
911081-011	NH	FELLOWSHIPS	CINCINNATI, UNIV. OF
911150-010	GU	FELLOWSHIPS	GUAM, UNIV. OF
911161-010	MI	FELLOWSHIPS	MICHIGAN TECH. UNIV.

800188

The objective is to detect the presence of carcinogens in municipal water supplies and sources, utilizing bacterial and mammalian cell monitors. Pilot investigations were conducted with dilute concentrations of carcinogens using the genetic markers of enhanced streptomycin resistance, and histidine dependence with mutant strains of Salmonella typhimurium. Parallel studies are being conducted with the mouse embryo cell R616 U infected with the AKR mouse leukemia virus, the rat embryo cell S1193 h, and the human diploid cell WI-38. In addition to known carcinogens, the indicator systems were tested with samples of finished and Mississippi River water.

The streptomycin resistance marker was not suitable for our purposes. Significant reversion rates were obtained from active carcinogens with histidine-dependent mutants alone, but not with compounds requiring metabolic activation. The use of liver homogenates to activate such compounds resulted in significant reversion rates being obtained. A finished water sample from New Orleans and a river water sample collected at Plaquemine produced significant reversion rates in the absence of liver homogenates. Infected R616 U cells were transformed by carbon tetrachloride at concentrations as low as 0.1 ug/ml. One New Orleans finished water sample and two river water samples have produced altered patterns of S1193 h cell growth.

Our smog chamber and laboratory studies continue to provide data necessary for the development of experimentally validated kinetic computer models of chemical and physical transformations in polluted atmospheres, which can be incorporated into urban airshed models. The latter are used in developing and evaluating emission control strategies and health warning systems for photochemical air pollution.

Specifically, the SAPRC smog chamber facility continues to be used in an experimental program designed to provide accurate and extensive data for computer model validation. Thus, the photochemistry program conducted in the 5800-liter evacuable chamber includes irradiations, under simulated atmospheric conditions, of NO_x -hydrocarbon systems in the ppb-ppm concentration range beginning with a single hydrocarbon and building through systems of six-component hydrocarbon mixtures of alkenes, alkanes, and aromatics. Studies of the effects on these systems of aldehydes and species such as HONO are included. In addition to extensive gas chromatographic analyses of hydrocarbons at the ppb detection level, a Fourier interferometer long-path infrared (LPIR) system and an off-line combined gas chromatograph-mass spectrometer system will be used for the characterization of additional trace products.

The laboratory program will continue to provide detailed product, mechanistic, and kinetic data that will support the chamber experiments and lead to the development of more accurate computer models. The laboratory studies this year will be (a) a quantitative investigation of the products formed in the reactions of OH radicals with benzene, toluene and possibly other selected aromatics in the presence of oxygen, and at atmospheric pressure, and (b) the determination of relative quantum yields for the formation of H atoms from formaldehyde over the wavelength region 270-350 nm.

A significant contribution to current air quality sampling technology would be the development of a simple air sampling system capable of determining particulate loading along with size distribution over a broad range of particle size. Current research is aimed at developing a two stage particle fractionator employing series filters which are selective with respect to particle size.

The Nuclepore surface appears to be a logical choice for such a filter. The simple geometry is readily modeled as a bundle of parallel circular capillary tubes which greatly facilitates the development of a theory for filtration characteristics.

Work is near completion on a first principles model of the inertial impaction characteristics of a large pore (12 μm) Nuclepore surface. Preliminary experimental data support the validity of the model and it is planned to have a validated model for filtration efficiency along with theoretical performance curves by mid 1976.

With these performance curves as a guide it is planned to conduct an experimental study to explore the feasibility of using series Nuclepore surfaces as a particle fractionator for air borne aerosols in the environment.

803069

This Short Course is a follow-up to the Short Course "Applications of Stormwater Management Models", sponsored by the EPA and held August 19-23, 1974 at the University of Massachusetts. The objective of the 1975 Short Course is to present the practitioner with concepts and modeling techniques used for prediction, control and management of urban stormwater problems. Emphasis will be placed on the EPA Stormwater Management Model; workshops are designed to acquaint attendees with the preparation of data input for the computer model. Participants are expected to be from consulting firms and government agencies specializing in design and management of water quality.

The Short Course is scheduled for five days in late July 1975 at the University of Massachusetts. A presentation of the common components of stormwater management models will be followed by detailed description of the EPA SWMM. Three workshops on data preparation for the Rainfall-Runoff, Transport, and Storage and Treatment Blocks as applied to a Case Study will then focus on needs of the practitioners. Lectures on field data collections for model calibration and the impact of stormwater on receiving water quality will also be included. The Short Course will end with the presentation of comparative case studies on use of the EPA SWMM for design and the WRE STORM for planning decisions. A Short Course Notebook will be prepared with the aim of providing an instructional lecture rather than seminar format.

803328

The ultimate objective of this feasibility study is to design and characterize a survey plan to make the desired measurements and to estimate the precision to be expected from a survey along with the cost of the operation. Precision is not always linear to cost and usually it is desirable to know the precision to be expected over a range of costs.

The objectives of the third year of this three-year study are:

To develop and evaluate a sampling survey design and field techniques required for rural runoff evaluation involving small drainage sub-basins, with compatible emphasis on:

- a. Evaluating cost of various sampling precision levels including a comparison of grab techniques with instrumental methods.
- b. Determining relationships between land use, physiography, physical and chemical values, rainfall-runoff, and the impact of these factors on receiving streams.
- c. Evaluating modeling techniques for determining input from rural runoff and effect on the chemical and biological characteristics of receiving streams.

There are approximately 100 enteric viruses of human origin which have been isolated from sewage, rivers, sea water, and water supplies. Despite concern for the presence of these viruses, there is as yet no rapid practical assay for their identification and detection. We propose to apply immunoenzymatic methods currently under development in our laboratories which will satisfy this need. These methods will increase the reliability of and decrease the time required for identification of these viruses. In addition, the methods we propose may also be applicable for virus detection.

The proposal consists of two phases of methodology: 1) identification of enteric viruses by immunochemical staining of virus-infected cells with enzyme-labeled antibodies and 2) identification and quantitation of enteric viruses by enzyme immunoassay. The first phase has been developed by us for use in identifying selected enterovirus types; this will be extended to include identification of all enteric viruses that can be readily cultivated. The second phase will be development of methods for identifying and quantitating cellular or extracellular virus. This method involves reaction of enzyme-labeled antibodies with viral particles; virus is identified and/or quantitated by assaying bound enzyme.

1. Objective - Determine production and marketability of methane gas from an existing sanitary landfill.
2. Approach - Construct wells within an existing sanitary landfill and withdraw gases at different rates to determine optimum withdrawal rate and radius of influence. Investigate current facilities and methods of processing methane gas from an existing sanitary landfill.

803399

The objective of the study is to evaluate long path laser monitoring of ambient level air pollution. The lasers that have been considered are semi-conductor diode tuned lasers and sequentially step tuned carbon dioxide lasers. Systems employing both techniques were tested during the summer of 1974 in St. Louis in connection with the Regional Air Pollution Study (R.A.P.S.). However, only the diode tuned laser system will continue to be tested during the summer of 1975.

The present plan is to use the laser system to make pollution variability measurements around two one kilometer square areas in the St. Louis area as a part of RAPS. One site will be urban and the other rural. A concurrent study will be made of the same area using portable monitors and bag samples. The results of the two methods will be compared.

Assuming favorable results from the comparison, it is planned to use the system during the summer of 1976 to make several pollutant variability studies for carbon monoxide, nitric oxide and ozone.

803510

The overall objectives of this project are, A. to further develop and refine efficient rapid and inexpensive monitoring methods for the detection and quantitative assay of low levels of viruses in large volumes of water and wastewater, and to evaluate various promising virus monitoring and detection methods by standardized and controlled procedures. B. To develop effective and economical procedures for the inactivation of enteric viruses in wastewater, renovated water and other forms of polluted water by ozone and to establish reliable methods for the control and evaluation of the process.

803643

The proposed work involves the fourth and final year of an on-going prospective serologic-epidemiologic study of persons occupationally exposed to municipal wastewater. The initial objective of this study was to determine the sensitivity of the methodology for appraising the health effects of human exposure to wastewater. Volunteers for the study were municipal employees in Cincinnati, Oh. engaged in sewer maintenance and highway maintenance work.

During the second year of the study the project was expanded with the added objective of determining the health effects associated with occupational exposure to viable aerosols generated by activated sludge wastewater treatment plants. Volunteers for this aspect of the study have been recruited from Cincinnati, Chicago, Ill. and Memphis, Tenn. The control groups are water treatment plant employees in Chicago, electrical distribution systems workers in Memphis, and the previously recruited highway maintenance workers in Cincinnati. A total of over 400 volunteers are currently active in the study, over 100 of whom were recruited at the time of initial employment at activated sludge wastewater treatment plants.

The protocol involves: quarterly collection of sera for immunologic, virologic and bacteriologic examinations, pharyngeal swabs and rectal swabs; yearly multiphasic and physical examinations; health diaries; evaluation of sickness and absenteeism reports; work observations; selected follow-up of worker families; and environmental monitoring. The monitoring program includes airborne-bacterial analyses and viral and bacterial analyses of wastewater. Workers are maintained in the study for a minimum of 12 months if possible. About 35 tests are included in the viral serologic survey. Results are statistically evaluated.

803651

This proposal describes a continuation of research in progress on the investigation of chemical ionization mass spectrometry for analysis of organic and organometallic compounds. Methods will be developed for the trace level quantitative determination of mixtures of metals as their volatile chelates using a chemical ionization mass spectrometer under computer control. The mixture spectra will be analyzed by comparing them with calculated spectra for the pure chelates. The ligands to be used are substituted β -diketonates related to acetylacetonate. Either positive or negative ions can be analyzed. A reference file of spectra of pure organic compounds suspected to be present in polluted atmospheres will be generated. It will be used to analyze spectra taken from mixtures of organics. Studies will be carried out of a series of carbonyls as well. Finally, real mixture samples will be provided by the U.S. Environmental Protection Agency for analysis of particulates which will contain organics, organometallics, and inorganic compounds.

Oil shale deposits in the Upper Colorado River Basin are located in the states of Colorado, Wyoming, and Utah. The large fraction of potential commercial deposits are contained in the Green River formation in the Piceance Basin of Colorado, however. The Green River formation is an Early Tertiary geologic unit, formed in a depositional basin during Eocene time. Topographic and structural highs surround the Piceance Basin on the South, East, and West sides. Both surface and subsurface drainage are toward the North to the White River. The White River is tributary to the Colorado.

The specific objectives of the proposed project are:

- A) To gather all available data pertinent to the present and future assessment of the water quality hydrology in the oil shale regions of the Upper Basin. These data will be sought from universities, federal and state agencies, and private companies.
- B) To summarize and analyze these data toward the identification of data deficiencies, needs for additional data, and procedures for the assessment of the impact on water quality hydrology.
- C) To develop procedures for the quantitative assessment of the quantity and quality of surface and subsurface runoff from processed shale residue and mine spoils, and to verify these procedures using large volumetric lysimeters at the Anvil Points, Colorado field site and by means of a mathematical model.

OBJECTIVES

- (1) To assess the potential of the aquaculture method of wastewater treatment as a suitable means of treating municipal sewage waters in a mid-temperate latitude on an annual basis.
- (2) To provide a set of design criteria for implementation of the aquaculture wastewater treatment method.
- (3) To achieve an effluent quality amenable to P.L. 92-500 and the 1977, 1983, and 1985 standards.

APPROACH

To evaluate differences between series operation of conventional lagoon treatment and an aquaculture system. Fish growth/unit time will be compared to effluent quality and certain ecological water parameters to determine the contribution of nutrient binding by the animals. Effluent quality of the conventional retention series will be compared to effluent quality of the aquaculture series.

PROGRESS

Studies conducted during the years 1971 - 1973 indicate high effluent quality may be obtained through fish culture operation in a series of conventional lagoons. The design and approach of the proposed project are patterned after this pilot study.

803715

The objectives of this project are to determine the extent and nature of interactions between fuel sulfur and NO formation mechanisms in combustion processes. Work completed to date includes an examination of the effect of fuel sulfur on thermal NO from gaseous turbulent diffusion flames. It was found that about 3,000 ppm SO₂ in the exhaust could result in thermal NO reductions of between ten and twenty percent, but that the greatest effect was present when SO₂ concentrations were high on the fuel lean side of the flame front. It was also concluded that results were dependent on aerodynamic factors caused by changes in swirl and injector type. The results give new impetus to our objective of attempting to relate premixed flat flame data to turbulent diffusion flame phenomena. This report also describes preliminary results on the effect of fuel sulfur on thermal and fuel NO from distillate oil flames. It was found that fuel sulfur did inhibit thermal NO but that its effect on fuel NO was negligible.

Work completed on the more fundamental aspects of this project include the design fabrication and shakedown testing of a versatile flat flame combustor and the conceptual design of the diffusion flame combustor. In addition a simplified set of reactions that adequately describe NO formation from methane/air flames was developed as a prelude to investigation of the effect of sulfur dioxide on both prompt and thermal NO. These results lead to new insight into the role of superequilibrium atoms on prompt NO. Mechanisms of NO reduction were also investigated, as a prelude to determining mechanisms of fuel nitrogen conversion, and the effect of SO₂ thereon.

803765

The main objective of the Research is to evolve an efficient, simple and practical method for the in-situ determination of particulate size in source emission.

The method of measurement adopted is the Digital Photo-electron Auto correlation technique in Laser Doppler Spectroscopy. Experiments will be done on hydrosols, aerosols and also opaque particles of smoke plumes in the laboratory with a view to applying the technique to in-situ determinations from smoke stacks.

The experimental set up has been completed. The light-scattered at an angle from the particles generated by an aerosol generator is received by a suitable photomultiplier and let in to an auto correlator interfaced with a PDP - 11 minicomputer for real-time measurements. The programming is done and calibration experiments with standard polystyrene latex spheres have been tried and found encouraging.

The study is designed to identify elements in activated sludge solids and anaerobic digester sludge which remove or kill viruses during waste treatment. Efforts are made to improve the technology for recovering and assaying sludge-adsorbed viruses. Present work employed viable poliovirus 1 (Sabin) labelled with ^{125}I as a tracer and demonstrated the following: (1) 95 to 99.9% of virus label was removed by cell flocs and cell-free exopolymers of four Zoogloea ramigera strains which had been isolated at treatment plants. (2) Metal cations mediated poliovirus adsorption, including Al , Fe^{3+} , Mg , Hg and Pb , but not Ca or Zn . (3) Virus was eluted instantly from Zoogloea cells and exopolymers by 0.05 M glycine, pH 11.5 and more slowly by fetal calf serum, pH 9.0. (4) Virus was adsorbed by mixed exopolymers extracted from the zoogloal flocs in activated sludge and from anaerobic sludge microbes. (5) Colpidium sp., Paramecium caudatum and mixed ciliates from activated sludge became radioactive after grazing on Z. ramigera strains which had adsorbed ^{125}I -poliovirus; the label was shed within 6 hrs after feeding. (6) Sucrose gradients of activated sludge solids showed that most of the virus adsorbed by sludge was associated with the microbial fractions. (7) Polyhydroxybutyrate granules (which are trapped normally within Z. ramigera flocs) adsorbed virus avidly but evidence suggested these were not responsible for significant removal of viruses from activated sludge.

The atmospheric fates of many of the halogenated and nonhalogenated pollutants proposed here for investigative study are poorly understood. Significant quantities of these chemicals are emitted into the atmosphere, and the sources of these chemicals are primarily anthropogenic. The possibility of stratospheric ozone destruction by stable halocarbons and the toxicity and carcinogenicity of many other halocarbons make continued research urgent. The amount of these chemical pollutants in the atmosphere is rapidly increasing and is a cause for concern. Halocarbons have also been used as tracers that provide an opportunity to understand pollutant transport from urban centers. More recently, reacting halocarbons have provided important information on the chemistry of the natural troposphere.

The overall objective of our three-year research effort has been to determine the distribution, sources, and sinks of important halogenated and nonhalogenated pollutants that have an effect on the stratospheric ozone. During the first two years of research we have developed the urban-nonurban relationships of halocarbon pollutants based on a number of field studies on the west coast. Extensive southern hemispheric data has also been collected. In the third year our emphasis will be on collecting additional data from a number of both clean and contaminated sites. The entire data base collected to date will be analyzed and a comprehensive final report will be prepared. The growth patterns of atmospheric halocarbons will be quantitatively determined. Global emissions data for halocarbons will be used to determine halocarbon atmospheric lifetimes. Methyl chloroform data will be analyzed to determine hydroxyl radical concentrations in the troposphere.

Three pilot infiltration-percolation basins of about 1/6 acre each have been constructed with underdrains at a depth of 2½ feet in silty loam soil. The normal ground water depth is about 4 feet. Stabilization pond effluent is applied at weekly intervals in quantities equivalent to a depth of 18 or 24 inches. Samples collected from the influent and effluent drain of each basin are analysed for BOD₅, suspended solids; ammonia, nitrate and kjeldahl nitrogen; ortho and total phosphorus, specific conductance and fecal coliforms. Infiltration rates are determined using automatic float recorders in each basin. Groundwater levels and quality are also monitored for the area. Specific project objectives are:

1. Demonstrate the use of infiltration-percolation land disposal as a means of up-grading existing secondary treatment to meet new effluent standards...
2. Determine acceptable loading rates for both a scarified and undisturbed soil for climatic conditions similar to those at Brookings, South Dakota.
3. Identify winter operating constraints imposed by the climatic conditions of the site.

Data has been collected since June 1975 and a technical progress report has been prepared describing the construction and operation of the unit into the summer of 1976.

The objective of this study is to determine the rate and extent of reaction of sulfur dioxide and other air pollutants at ppm concentrations with aerosol droplets of the order of size of one micron. In the initial experiments radioactive $^{35}\text{SO}_2$ will be transferred to aerosols, and the total radioactive sulfur transferred counted. Models of the mass transfer and reaction will be fit by the experimental data, and used to elucidate the extent of reaction and oxidation to sulfate.

803851

Aerosol size distributions have been measured in the St. Louis area as part of EPA's Project MISST using aircraft and ground based self contained mobile laboratories. These measurements were made with a group of collaborators such that a complete array of chemical, physical, and meteorological measurements were obtained on a coal fired power plant plume. The University of Minnesota's portion of the project included aerosol measurements aboard an aircraft and the operation of a mobile van on the ground under the plumes.

This mobile van was also operated on freeways in the Los Angeles area during October 1976 as part of an EPA sponsored project to study sulfur aerosols on roadways.

Much of the work during the next project year will be analysis and reporting of the large amount of data obtained during the past several years. Analysis is being directed toward obtaining aerosol growth rates in the plumes, aerosol nucleation rates in the plumes and surrounding atmosphere, and toward better descriptions of the aerosol size distributions. Laboratory work toward the development of a continuous instrument for the measurement of aerosol sulfur is also being partially supported by this project.

803856

Funds are requested for the construction of a laboratory system which will provide running seawater at ambient temperature and at 2°C, 4°C, and 8°C above ambient. Fouling development and changes in fouling community structure will be followed at each temperature for several years on clay tile plates (232 cm²) submerged in October 1975 and April 1976. Larval recruitment at each temperature will also be monitored. Parallel experiments will be conducted simultaneously on plates submerged under the Duke Marine Lab dock. Data will be used to determine the effect of heated effluents on community structure and function.

The proposed research would attempt to develop a theoretical framework for the economic evaluation of the social benefits of non-renewable resource conservation through recycling. Present market prices for non-renewable resources may not be indicative of intergenerational social benefits because of (1) a divergence between private and social rates of discount, (2) irreversibilities in natural environments, and (3) the neglect of the welfare of future generations by members of the present generation. The research would also attempt to derive rules for approximating the value of resources conserved through present recycling efforts. The study should provide the framework by which the other principal non-market benefits of recycling (lowered disposal costs and lessened environmental disruption) can be assessed, and thus contribute substantially to the development of an optimal materials policy for recyclable resources.

The objective of this program as a part of project MISTT (Midwest Interstate Sulfur Transformation and Transport) is the quantitative determination of the fate of atmospheric sulfur, i.e. the rate of sulfate formation and the rate of SO_2 removal to the ground.

Large plumes emitted from the elevated (power plant) and low level sources (urban) were studied on the regional scale. Airborne measurements in the plumes and background air outside the plume were carried out for SO_2 , O_3 , NO_x , b_{scat} , aerosol charge, particulate sulfur concentration and supported by extensive meteorological measurements.

Sulfur budgets of well defined plumes were assessed. Transport of pollutants in plumes was characterized in terms of horizontal "long range transport" and vertical transport. The importance of dry removal for different types of plumes and meteorological conditions was assessed. SO_2 to particulate sulfate conversion rates were determined for the coal-fired Labadie power plant plume and the diurnal variability (1-4% per hour for noon hours and 0.5% per hour for night hours) was determined.

The objective of the proposed research is to continue work on improving the relationship between instrumentally measured in-stack light transmittance and the aerosol properties. The research approach calls for simultaneous measurements to be taken of particle size distribution, particle mass concentration and in-stack light transmittance. A novel approach is suggested for obtaining cascade impactor samples suitable for X-ray spectroscopy analysis. Results of the past year have served to validate a theoretical expression relating in-stack transmittance to particle mass concentration for a pulverized coal-fired boiler and with only partial success for an oil-fired boiler. Specific objectives for the proposed project include testing of coal and oil-fired boilers and other industrial sources.

Program Objectives: This research grant application renewal, prepared by the City of Ames and its sub-contractors, is for a third year continuation of a three-year program to conduct an in-depth evaluation of the environmental, economic, and technical aspects of a full-scale on-line solid waste recovery system. This system is producing refuse-derived-fuel to supplement firing in coal-fired steam generators and is providing for valuable metal recovery. The program has the following principal objectives: (1) Technical, economic and environmental evaluation of the facilities and equipment, individually and as a system, including both the processing plant and associated power plant operations; (2) Characterization of the refuse fuel and byproduct materials produced by the system; (3) Determination of the environmental impact of firing MSW as a supplementary fuel in a utility boiler, including air, water and solids effects. Laboratory analysis and measurement instrumentation is being conducted by E.R.D.A. Ames Laboratory (Iowa State University) personnel.

This project is a study of the microbial degradation of chlorodane, toxaphene and lindane by isolates obtained from freshwater or its sediments. The interaction of these pesticides with microorganisms will be investigated employing an aerobic system (shake flask co-metabolite enrichment) and an anerobic (trickling filter) system. Parameters to be studied are metabolites, degradation notes, and the effects of pH, temperature and oxygen supply.

803953

Objectives. The objectives of the proposed work are to confirm laboratory studies of the leachate recycle concept with larger, prototype test cells and to elucidate information on mass flux of gas and leachate components, with particular attention to the effect of evapotranspiration on the rates and quantities of leachate.

Approach. Two doubly-lined test cells, 12x12x10 feet high, one completely closed for quantitative gas measurement and the other covered with soil as is the usual practice at landfills, will receive identical volumes of water and weight of shredded solid waste. The moisture content will be brought to 60 percent (wet weight) by adding digested sewage sludge during construction. Gas will be monitored for CO₂, CH₄, and other constituents and total volume; leachate will be monitored for BOD, COD, TOC, total and individual volatile acids, alkalinity, acidity, PH, nitrogen and phosphorus, chlorides, sulfides or sulfates, and pertinent heavy and alkaline earth metals. The solid waste of each cell will be sampled at the start and completion of the tests for visual and quantitative characterization.

Output. Mass flux will be determined for the contaminant monitored and analyses made to interpret and control the stabilization process. Modifications to the basic systems operation will be made as required. The energy generation potential, methane production, will be assessed. Recommended design and control procedures for leachate containment and recycle will be developed. A rigorous assessment of the cost/benefits of the recycle concept, in context of daily operation/implementation, including economic and technical feasibility, and the extent of potential application will be prepared.

The objectives of this work are to continue a study of the occurrence and toxicity of various contaminants and groups of contaminants found in renovated wastewaters. The study will involve the use of mammalian cells (platelets and neutrophils) to study the toxicity of concentrates and various fractions of the concentrates when added to cell cultures in vitro. The testing of cytotoxicity of the concentrates will serve as primary toxicity screens, furthermore by separating the concentrate into various chemical classes such as polynuclear aromatic hydrocarbons, chlorinated hydrocarbons, etc., the various chemical groups can be tested as groups for toxicity. Thus the cytotoxicity tests will serve as indicators of the most important chemical groups and compounds. The work will consist of the use of various techniques to concentrate contaminants in renovated wastewater. These concentrates will then be tested for toxicity to the cell cultures (both in terms of functional effects and effects on energy metabolism). The concentrates will be further fractionated and tested again for toxicity. The cells to be used will be obtained from both animals and human volunteers.

1. Objectives. To ascertain the biological and chemical responses of a tropical coral reef/estuary ecosystem to the termination of sewage stress. To what extent and at what rate does the ecosystem return to pre-stress conditions?
2. Approach. Field monitoring and field and laboratory experiments are being performed.
3. We have 1+ years of time-series pre-diversion baseline data, and we anticipate collecting 1+ years of post diversion recovery data. We will then be able to document the recovery characteristics of the ecosystem and derive predictive ability therefrom. We have published several papers and have prepared two annual reports to date.

The objectives of this study are (1) to determine the quantity of enterovirus which must be ingested with drinking water to produce an infection, the "Oral Infectious Dose" (OID), and (2) to determine how many OID's must be ingested with drinking water to produce disease, the "Oral Pathogenic Dose" (OPD). Swine have been chosen as the best available representatives of man for such a study; they and their homologous enteroviruses comprise our model system. Early-weaned pigs (3-4 weeks old, 15-20 lb.) are tested to determine that they are neither infected nor immune to the virus with which they are challenged. They are housed in individual isolators and challenged with measured doses of virus in drinking water. Starting with one tissue culture dose (plaque-forming unit) per animal, challenge doses are being increased with each successive cycle of experimental animals until the OID and the OPD have been reached. The OID seems significantly to exceed one plaque-forming unit; pathogenesis has yet to occur. Once experiments with one virus serotype have been completed, a second challenge virus will be used in a second series to confirm the initial findings.

804033

A study to obtain experimental evidence that defines and explains the ability of biological surfaces, specifically soil, to scavenge air pollutant gases from the atmosphere. The aim of the first phase of the project is to determine through systematic laboratory experiments the quantitative removal rate for light hydrocarbons and other selected air pollutant gases by different candidate soil ecosystem types. In addition, the development of ATP measurements for indexing the flux in the microbial biomass in the soil will be further investigated. The second year's objective extends the research into an area of more sophisticated interest as it regards determining the threshold concentrations at which biological and/or biochemical effects can be measured. The overall goal of the project is to determine the microbial biomass response to air pollutant gases at levels equal to or greater than the National Ambient Air Quality Standard. These data are needed in order to design an appropriate field monitoring package for determining biological effects of air pollutant gases for aiding in the compliance with ambient air standards.

The overall objective of this project is the modification, calibration and verification of mathematical models that use input information (e.g. nutrient, pesticide, and soil properties; management practices; watershed characteristics; and climatic factors) and predict concentrations and losses of nutrient and pesticides in surface runoff. Over a thirty month period, numerous samples of surface runoff will be collected and nutrient (nitrogen and phosphorus) and pesticide concentrations in both the sediment and water fractions will be determined. Soil profiles of watersheds (~20 acres) in corn and soybeans (fertilized and treated with pesticides) and in grass (fertilized 2 out of 3 years) will be sampled periodically and the samples analyzed for nutrients and pesticides to provide source data. In the case of pesticides this data will be used to calibrate and verify the pesticide transport and runoff model (PTR) already developed. The data for nutrients will be used to develop, calibrate and verify the companion nutrient transport and runoff model. Sediment transport models will be developed and tested as a part of the transport system.

In addition, flow, sediment, nutrient, and pesticide levels will be monitored at a stream controlling a 19.5 mi² watershed which includes the three field-size watersheds of interest. Four intra-basin stations upstream from the main station will also be located and monitored during selected runoff events. This data along with inventory data of farm management practices within the large watershed will be used to evaluate the effect of overland flow and channel processes on the transport of agricultural chemicals.

As of April, 1976 the field installations are nearly complete. Flow measurements and sampling were initiated between January 1 and April 15. The intra-basin stations will be completed in May.

Overall goals of this program have been to demonstrate the feasibility of using coherent anti-Stokes Raman spectroscopy to identify pollutants in dilute (micromolar) aqueous solutions and to automate its use in conjunction with a liquid chromatograph. At the present time, efforts are divided almost equally among three aspects: automation, chromatography and spectroscopy. With regard to automation, construction of the hardware for interfacing is proceeding well and is expected to be finished early in 1978. Then, writing and debugging of software will be started. Because programming will be done in real-time BASIC, for which many of the assembly-language service routines are already available, it should be possible to develop and test modules of the overall operating program relatively easily. The other major aspects, the chromatography and the spectroscopy, will concentrate upon one or two typical polychlorinated biphenyls for use as test solutes. If time remains, a typical polynuclear aromatic hydrocarbon, nitrosamine, and carbamate will be included.

The basic objectives of the proposed study are: (1) to determine the minimum human oral infective dose of Sabin type 1 poliovirus strain in infants, (2) define the age specific rate of acquisition of antibodies to a number of important enteroviruses in young children with similar socioeconomic backgrounds who have different drinking water sources, (3) determine by serologic testing the incidence of enterovirus infections in children who participate in swimming classes at urban beaches and pools and compare to a control group engaged in non-swimming team sports, and (4) determine the frequency of recent exposure to recreational waters by children seeking medical attention with confirmed enteroviral illness and compare to a control group being seen for non-infectious problems. Data obtained from this study will indicate whether: (1) infants can be experimentally infected with very low oral doses of enterovirus, (2) children with similar socioeconomic backgrounds who are exposed to different types of drinking and recreational water sources acquire enterovirus infections at different rates, (3) children who swim frequently at beaches or pools acquire more infections than children who participate in non-swimming team sports, and (4) children with enteroviral illnesses have recently had greater frequency of swimming than children who did not acquire enteroviral illness during this time.

The objective is to develop a method of predicting potential ground-water degradation in strip coal mining on the basis of the mineralogy of the overburden. The mineralogy of overburden core samples will be determined and compared with the mineralogy of similar material that has undergone extensive chemical weathering in old spoil piles. The ground-water degradation that has resulted from leaching through the old spoils will also be determined qualitatively and quantitatively. This field-oriented, cause-and-effect approach will help to establish the relationship between the mineralogy of overburden and potential ground-water degradation.

804174

Objective: To establish the feasibility of a continuous electrolytic treatment process to reduce the oil content of oily emulsion wastewater from machining operations to acceptable levels for discharge, without generating the large quantities of watery sludge requiring disposal which are common to conventional chemical treatment processes.

Approach: Demulsification will be accomplished by passing the oily wastewater through permeable electrodes. Bench scale experiments have shown that the oil content of waters containing several thousand ppm of emulsified oil can be reduced to a few ppm in a flow system at practical rates and at very low power cost. The floating oily sludge produced is high in oil content and low in water content, so that compared to chemically produced sludges the sludge volume to be handled and disposed of is small, it can be separated from the water phase by flotation and skimming rather than by sedimentation, and recovery of the oil resource is more practical.

Current Plans: In the first year, it is planned to construct, develop, evaluate, and demonstrate a pilot unit (1500 gpd) to treat actual oily wastewater from the machining operations at a manufacturing plant.

804175

Supersaturation of air in natural waters either by hydroelectric plants or thermal effluents is becoming an increasing environmental problem and has already accounted for large mortalities of anandromous fish in the northwestern United States. Increasing development of hydroelectric and/or nuclear plants as a result of increased energy needs can be expected to increase this problem, definition of which requires less specialized, easily available analytical techniques.

The methods currently available for measuring and/or monitoring total dissolved gas pressure in liquids, while accurate and reliable, are expensive, require specialists for operation, and are not suitable for continuous unattended monitoring.

The objective of the project is the design and development of simple, inexpensive instrumentation using the existing principle of a diffusion membrane and electronic pressure transducer to measure and record total dissolved gas pressures. Alternatives for membrane materials, configurations and mechanical interfaces and signal analysis will be explored, constructed and field tested.

804179

The objective of this project is to apply ion exchange to the determination of trace metal ions at submicromolar concentration levels. Two methods are being investigated (1) Trace ions in a sample donor solution are concentrated by loading upon a pellicular ion exchanger, and these are eluted or stripped into an acceptor solution at an enhanced concentration level so that they can be more easily measured. In studies with Cu(II), enhancements over 100-fold have been obtained that are in accord with the theoretical Donnan enhancement. (2) In another phase of this project, the kinetic and equilibrium properties of the copper ion-selective electrode are being investigated in the submicromolar concentration region. When they have become elucidated and measurable, these properties may serve to characterize the electrode, or they may have analytical usefulness.

Keywords: Ion exchange, trace metal ions, copper ion, ion-selective electrode, speciation.

804191

The long-range objective of the Lake Apopka, Florida, restoration program is to restore the quality of the lake for recreational use.

804218

The objective of this study is to critically evaluate the tentative Standard Methods procedures for concentrating and detecting enteric viruses in large volumes of drinking water and other finished waters. The evaluation of the procedures is being done with a total of nine different viruses representing the four major enteric virus groups. These viruses are: poliovirus type 1, coxsackieviruses A9 and B3, echovirus 7, bovine enterovirus type 1, reovirus type 3, adenovirus type 1, simian virus 11 and Minute Virus of Mice. In a later phase of the evaluation, mixtures of naturally occurring enteric viruses obtained from wastewater will also be utilized. The four different types of microporous filters that are currently recommended as virus adsorbents are being simultaneously evaluated using 100 gallon volumes of tapwater experimentally contaminated with low levels of the test viruses. All aspects of the tentative Standard Methods procedure are being investigated, including primary virus adsorption, primary virus elution and reconcentration. If the presently recommended tentative Standard Methods procedures for concentrating and detecting enteric viruses in finished waters are found to be incapable of efficiently recovering certain enteric viruses, then modifications of the methodology will be investigated and evaluated.

804278

The objective of this grant is to obtain a better understanding of atmospheric turbulence from analyses of tower data collected in the layer up to 300 meters above the surface in complex terrain and boundary layer data and also to update and to extend techniques for predicting atmospheric dispersion in the planetary boundary layer.

804318

The proposed research will continue to investigate the relationship between dose and duration of exposure to levels of pesticide in blood and saliva. The mechanism of transport into saliva will be established using in vivo and in vitro methods, some of which have been developed in this laboratory. Human samples will be evaluated utilizing the services of the Departments of Agriculture and Pathology.

804323

A soil is contaminated when foreign substances are introduced into the plow layer which adversely affect plant growth. Such soil exists in Henryetta, Oklahoma near a zinc roaster and smelter which was in operation there for the last 50 years. The plant was shut down in 1969. The emissions from the smelter have destroyed vegetation and polluted the soil in surrounding areas for approximately two (2) square miles. The purpose of this study is to determine if reclamation of the soil can be accomplished through the use of dry sludge, municipal effluent, and fertilizers. This study will be conducted by faculty members of the Physical Science Department, Langston University, Langston, Oklahoma. A portion of the work, plot studies at the site in Henryetta, Oklahoma, will be subcontracted to the Okmulgee County Conservation District. The project will cover a three year period starting in 1976 and terminating in 1979. A request of \$65,375.00 to carry out the project was made to the Environmental Protection Agency for the first year. A total of \$192,810.00 was requested for the three year period.

804331

Grumman will conduct a twelve (12) month study to investigate the viability of utilizing, on a production basis, the new reduced-pollution, corrosion-protection paint systems in lieu of the currently used organic paint systems and cyanide plating solution.

804345

Research will be continued in areas concerned with the chemistry, metabolism, environmental alteration, and mode of action of insecticides in mammals, plants, insects, and soil. Emphasis will be placed on the fundamental intoxication and detoxication processes which take place in biological systems and in the environment. The following ongoing projects will be continued: (1) Studies on the isolation, identification, and assessment of the toxicological properties of impurities present in technical organophosphorus insecticides. Technical insecticides currently under investigation include malathion, phenthoate and fenthion. Studies on the mode of action of the potentiating effects caused by the impurities are included. (2) Studies on the metabolism, toxicology and environmental fate of promising new insecticides. The compound presently being investigated is dibutylaminosulfenyl-carbofuran. (3) Synthesis and evaluation of delayed neurotoxic activity of structural analogs of leptophos and related esters. Included in this study is the resolution of the chiral isomers of leptophos and evaluation of the isomers for neurotoxicity. (4) Structure-activity correlation analyses of DDT analogs, carbamate esters, and phosphoramidates. (5) Studies on the mode of action of selectively toxic derivatized methylcarbamate insecticides. (6) Investigations of surface-modified supports for the gas chromatography of insecticides with emphasis on the separation and identification of impurities present in technical materials. (7) Studies on the cause and consequence of insecticidal action at the neurophysiological level.

804348

Kinetic and mechanistic studies will be made to recognize and to quantitatively characterize the several reaction pathways which result in the chemical transformation and removal of SO_2 , NO , and NO_2 in the polluted atmosphere. In one phase of the work the seemingly important reactions of the alkyl peroxy and hydroperoxy radicals with SO_2 , NO , and NO_2 are being investigated. Kinetic flash spectroscopy, steady state photochemical systems, and studies in flow systems are employed to follow the kinetics of the RO_2 reactions. The identification and kinetic characterization of the initial reactive products of these reactions will be attempted using infrared, visible, ultraviolet spectroscopy, mass spectroscopy, and more conventional chemical methods. In other phases of this work we plan to study the reaction pathways which involve the reactions of the electronically excited SO_2 with atmospheric components and the reactions of the HO -radical with SO_2 , NO , NO_2 , and other atmospheric pollutants of special interest.

The mechanism and kinetic information obtained in the study will be applied directly to the development of a more realistic computer simulation scheme for the prediction of rates of SO_2 and NO_x removal reactions and the nature of the initial "sulfate" and other unidentified and recognized products of the sunlight-irradiated, NO_x , SO_2 , RH -polluted atmospheres.

804350

The principal objective of this project is to conduct an extensive evaluation of ultrafiltration for wastewater treatment at the San Leandro plant of the Dewey and Almy Chemical Division of W. R. Grace. Treatment of this waste by ultrafiltration is an application of novel technology to a serious wastewater problem, and provides an economically feasible means of meeting effluent standards for hexane extractables and other contaminants.

This test program will be supplemented by feasibility experiments on the treatment of product waters from ultrafiltration by reverse osmosis and carbon adsorption.

The technical and economic feasibilities of full-scale treatment systems will be assessed. At the San Leandro plant, ultrafiltration tests will be conducted concurrently with waste characterization tests of the in-feed, concentrate and permeate. A sampler will be used to obtain daily composite effluent samples.

Operating parameters to be routinely monitored include processing temperature and pressure, the ultrafiltration unit circulation rate and pressure drop, and the ultrafiltration permeate flow rate. The UF unit will be operated continuously for twelve weeks.

In addition to the above, reverse osmosis and carbon adsorption tests will be conducted on the permeate to assess technical and economic feasibilities for treatment of the UF product water to meet the effluent limitations guidelines for the industry.

The purpose of this study is to obtain information concerning the mode of action, excretion, and metabolism of the cyclodiene insecticides.

A mortality study employing mice was conducted with combinations of toxaphene (T) and methyl parathion (P) to determine possible potentiation between these insecticides. One-half LD₅₀ doses (T:P, 56:16 mg/kg) were employed as well as a 2:1 combination (T:P, 32:16 mg/kg). Mortality occurred in only combinations containing P; however, there was a lack of potentiation between these two insecticides.

Mice were dosed with combinations of 25 mg/kg ³⁶Cl-toxaphene (T), 3.2 mg/kg ¹⁴C-chlordimeform (C), and 12.5 mg/kg methyl parathion (P), i.e., T, P, C, TP, TC, PC, TPC. There were no statistical differences among the various treatment combinations for ³⁶Cl-excretion in the urine. There were differences for feces, but no definite pattern was apparent. The other significant differences were between a single dose and a second dose. Mean separations for these significant differences are in the process of being performed.

A study is being conducted consisting of two parts: effects of toxaphene ingestion on neo-natal development, as determined by certain behavioral criteria and the effects on post-natal maze learning in rats. Results for the maze learning experiments are still in progress. The following tests were used to assess neo-natal development: swimming, grasp-hold reflex, righting reflex, and startle response. Treated pups showed a suppression in the development of swimming ability on days 7-9; treated pups showed a stronger grasp-hold reflex on days 15-20 when this response declined in the control group. There was no significant difference in the development of startle response, and the exposed pups developed the righting reflex two days later than control pups.

Measurements of ionic fluxes for the ventral nerve cord in toxaphene-poisoned P. americana are being made.

(1) Objectives: Compare cholinesterase activities, levels of intact organophosphates in blood and adipose tissue, and urinary metabolites of rats exposed to halogenated aryl and aliphatic organophosphorus compounds and non-halogenated aryl and aliphatic organophosphorus pesticides. Relate symptomatology, cholinesterase depression and levels of intact pesticides in blood and urinary excretion of metabolites in persons occupationally exposed to these same chemicals.

(2) Approach: The concentration of intact pesticide in blood and adipose tissue, quantity of urinary metabolites excreted in 24-hour intervals and effect on cholinesterase is measured in rats individually exposed to a dozen organophosphorus pesticides. Human subjects occupationally exposed to the same compounds are monitored for the above parameters in order to determine the validity of the animal model.

(3) Current Plans and/or Progress: Partition coefficients and hydrolytic half-lives have been determined for all pesticides included in the investigation. Recovery studies of metabolites in urine and parent compound in blood and tissue have been completed. A micro-cholinesterase method designed to be used in the animal experiments has been validated. Animal exposure experiments have been completed for eight of the twelve compounds under study. Finally, five of twenty-five occupational case studies have been completed.

804375

The objective of this continuation grant is to define the distribution of pathogenic *Naegleria* in the State of Florida. Multiple isolates have been made from freshwater lakes as well as thermally polluted one. Overwintering appears to be confined to lake bottom sands and/or sediments. Over the next year this aspect will be or should be confirmed.

A rapid method for identification has been developed but requires additional testing of specimens from various areas.

Immunological and physiochemical aspects of pathogenic *Naegleria* and seropositive nonpathogenic *naegleria* will be investigated to determine their relationship.

804385

Public Technology, Inc., in cooperation with the American Water Works Association Research Foundation and the National Water Well Association, will conduct a Fact Finding, State-of-the-Art, survey of municipal water treatment practices involving ozonation overseas, in Canada, and in those few installations that are operating in the United States.

The objectives are to document specific data on the known application of ozone for drinking water treatment, including data on engineering design, effectiveness, health and safety aspects, effects on materials of construction, reduction and/or elimination of sludge disposal problems by use of ozonation in place of chemical treatments, and costs of ozonation. Specific emphasis will be placed on documenting what is currently known and practiced on the use of ozone for removing dissolved organic materials prior to the disinfection step, and on identification of oxidation products formed by treatment with ozone.

The project will be one year in duration and will consist of identifying existing facilities worldwide currently employing ozonation as part of their water treatment process. Information will be gathered by questionnaire and by site visits to selected facilities in Europe and Canada.

804403

The investigation is concerned with the nature, distribution, and origin of the inorganic constituents of coal. This "mineral matter" in coal is, at times, deleterious and may, among other influences, contribute significantly to problems of air and water pollution. In order to obtain a relatively unaltered mineral matter residue as a starting material for our investigations, the technique of electronic low-temperature ashing is routinely used. After ashing the coal at temperatures below 150°C, the mineral matter residues are investigated by X-ray diffraction, and optical and electron microscopy for mineralogical analyses; by X-ray fluorescence spectroscopy, atomic absorption spectroscopy, optical emission spectroscopy, electron microprobe analyses, neutron activation analyses, and general "wet chemical" methods for elemental analyses.

The major areas of interest in which investigations are continuing are: 1) The mode of occurrence, distribution of trace elements and minerals in coal, 2) the mineralogy and genesis of iron and zinc sulfide minerals in coal seams, 3) mineral and elemental distribution within coals of the Illinois Basin, and 4) the potential for removal of minerals and their constituent chemical elements by coal washing techniques. Data from all of the above investigations are then related to the origin and geochemical history of the coal seams.

804413

This project involves the development of sensitive chromatographic procedures to analyze low levels of ammonia from atmospheric samples. GLC column technology will be investigated and the conversion of NH_3 to NO in conjunction with a chemiluminescence NO_x monitor will be used to detect eluted ammonia.

804421

This research proposes to conduct a state-of-the-art review of the various thermal and chemical treatments for improving the quality of the fuel fraction of shredded municipal refuse.

From this review a selection of the most promising treatments will be made for subsequent laboratory evaluations. Also, the economics of any process to be studied in the laboratory will be carefully evaluated.

804442

The distribution of hazardous substances in Saginaw Bay will be surveyed during 12 cruises in 1978. Objectives of the study are to: support the continuing development and verification of transport models; define the distribution and fate of hazardous substances in bay water, sediments, and biota. Sampling and in situ monitoring will be conducted at 26 primary stations off-shore and 5 secondary stations inshore (i.e., marsh and island littoral zones). Samples of water, particulates, sediments and aquatic organisms will be analyzed for metals (zinc, copper, lead) and organic contaminants (chlorinated hydrocarbons) will be used to develop a description of mass balance for Saginaw Bay.

This work is part of a continuing EPA study of water quality dynamics in Saginaw Bay, begun in 1973.

The objectives of the research project are to:

1. Determine the extent and nature of water quality problems originating in water distribution systems in the U.S.
2. Conduct laboratory studies to assess the potential for a treated water to promote sediment deposition and microbial growth in distribution systems.
3. Determine the role of microorganisms in mediating chemical changes observed in distribution systems.
4. Determine remedial measures for controlling sediment deposition, organism growth and quality deterioration.
5. Prepare a guidelines document for use by water utilities for assessing and controlling water quality problems in distribution systems.

A nation-wide mail survey, followed by selected site visits, will be made to determine the extent and nature of water quality problems in distribution systems. Laboratory studies will be conducted using pipe loops to determine the water quality changes under varied conditions of input water quality. Alternate methods to control the water quality deterioration in laboratory pipe loops will also be tested.

At the present time, the national survey of water quality problems in distribution systems has been completed. Laboratory pipe manifold studies showed that chlorine dose of 1.0 mg/L was quite effective in controlling microbial growth and dissolved methane promoted microbial growth.

RESEARCH OBJECTIVES:

1. To study design and operational problems of commercially-constructed digesters and to develop creative and practical alternatives or modifications.
2. To develop methods of optimizing all products of the digestion process.
3. To develop optimization criteria for the integration of anaerobic digesters into rural and aquaculturally based environments.
4. To look at the legal, social, and political problems which may be created by large-scale digesters.
5. To conduct a systems analysis of environmental issues related to the processing of agricultural waste through anaerobic digesters.
6. To study the feasibility of producing alcohol to meet mobile fuel needs as part of the energy system on farms and in rural areas.

This research will examine a mechanism of cycling for various xenobiotics in and through estuarine and marine sediments. A lugworm, Arenicola cristata (Polychaeta: Arenicolidae), will be studied to define and quantify movement of compounds through the sediment as a result of reworking and biological accumulation. Experiments are designed to determine, (a) how lugworms move xenobiotics into and through the substrate when the compounds are introduced into the overlying water column; (b) how effectively lugworms move sorbed xenobiotics from various depths in the sediment to the surface and (c) what volume of sediment could be exposed to xenobiotics due to reworking by lugworms.

A large body of research exists on integrated regional environmental management systems. Yet the management approach discussed in this research does not go far enough in preparing implementation strategies for them. The Environmental Law Institute proposes to expand this research and to prepare a set of materials which would assist state and regional and local governments in developing sound implementation strategies for their environmental management programs.

The Institute would: extend the residuals management framework suggested in the existing research by developing components relevant to implementation; would analyze in much greater detail than heretofore the governmental and social dynamics of the actual implementation of regional environmental management programs; would organize and interpret existing research according to the perceptions and needs of regional and local implementing entities; would update implementation research in light of additional experience; would develop the relationship between these approaches and the variety of federal and state environmental protection statutes and regulations already in effect; and would analyze EPA's existing authority in this area. As the vehicle for its research, the Institute proposes to prepare four published reports, each consisting of a short descriptive booklet and a longer technical companion monograph fully treating each topic.

804501

The first objective of the project is to determine the growth rate of Catostomus commersoni under different temperature regimes and to construct response curves that can be related to food consumption. Subordinate objectives are (1) to determine the influence of size on growth response at different temperatures and (2) to determine the relationship of optimum temperature to incipient lethal temperatures. A second objective is to determine the influence of reduced rations as compared to ad libitum rations on the optimum temperature for growth in three size groups of fish. Data will be gathered and analysed in a form which will provide input to ecosystem modeling.

804525

To determine the reaction sequences used by bacteria and fungi to degrade dibenzofuran, dibenzodioxin and their chlorinated derivatives. Organisms that can degrade unsubstituted dibenzofuran and dibenzodioxin have been isolated from soil and marine environments. These organisms are being used to identify each metabolic intermediate in the degradative pathways. Once the metabolites have been identified the effect of chlorine substitution on the metabolism of these compounds will be investigated. Current plans and progress have elucidated the initial reactions used by *Beijerinckia*, *Pseudomonas* and the fungus *Cunninghamella elegans* for the degradation of dibenzofuran. The initial reactions in the bacterial degradation of dibenzodioxin have also been elucidated. These studies are continuing.

The purpose of this project is to study chemically induced tumors in teleost fishes. Both marine and freshwater species will be exposed to low levels of a known carcinogen for 300 days. Fish developing tumors or other pathologies during this period will be sacrificed and tissue from the liver, kidney, intestine, and gills will be studied histologically. Tissues from all the fish with no grossly apparent pathologies at the time the experiment is terminated will be studied in the same manner in order to detect any neoplasias or preneoplastic conditions.

(1) Objectives: 1. Evaluate overall effectiveness of the disposal pits currently in use based on materials previously deposited in each. 2. Determine presence or absence of environmentally hazardous compounds in each. 3. Continue to sample each pit during tenure of study. 4. Establish experimental systems for studying the fate of selected pesticides in isolated micro-pits under controlled conditions. 5. Evaluate biological activity in present systems. 6. Develop plans and specifications for disposal system construction and management.

(2) Approach: Conduct a 5 yr. chemical and biological study of 2 existing pesticide disposal systems used at the Agronomy-Ag. Engineering and Horticulture Stations which have been in use 10 and 5 years respectively. Additional controlled micro-disposal systems will be established to determine the fate and biological consequences of known quantities of selected disposed compounds. Accurate data will be collected on identity, quality and concentration of unusual dilute insecticides, fungicides and herbicides deposited in existing and two new disposal pits. Reliable recommendations for disposal systems for farms and commercial application should be developed as a result of the study.

(3) Current plans: Preliminary analyses of the contents in the existing pesticide disposal systems were initiated in May 1976 to identify their bacterial and chemical composition. With the award of the grant in October 1976 plans and construction of the experimental micro and macro pits could be completed. Regular sampling and analysis of both existing and experimental pits are in progress.

804536

Objectives - - (1) Conduct a field sampling program designed to statistically test whether shading and/or agricultural herbicide factors are related to submerged aquatic vascular plant die-offs in Chesapeake Bay. (2) Conduct microcosm bioassays of herbicides under unstressed and stressed conditions. (3) Directly test for adverse effects of runoff from farm fields on plants in large tanks.

Approach - Field data would be collected at a series of stations on tidal Rhode River (on the western shore), tidal Choptank River (on the eastern shore) and near the Poplar Islands (open bay) at a series of times in order to measure species composition and populations of plants; shading factors in the water column, herbicide factors in bottom sediments, suspended sediments and surface water, and other habitat factors. One species would also be intensively bioassayed in microcosms with atrazine and linuron to test for individual and synergetic effects under unstressed and stressed (low light, high salinity, high temperature) conditions. Estuarine partition coefficients would be approximated. Storm water runoff from a corn-field watershed would be diverted into a large tank containing plants and compared to a control tank.

Current Progress - Two years of data has been collected toward objectives (1) and (2). Several publications are in press.

804547

The objectives of this research are to characterize the forms and amounts of Cu, Zn, Ni, Cd, and Pb in sewage sludges and to determine the fate of these metals in soils incubated with sewage sludge under laboratory conditions. Specific objectives are: (1) to utilize non-aqueous and specific metal extractants to characterize the mechanisms of metal retention in sewage sludges and to determine the components in sewage sludge responsible for metal retention, and (2) to elucidate the fate of metals added to soils in sewage sludges utilizing radiisotopic, extraction, and equilibration techniques.

Several approaches will be employed to characterize the forms of metals in sewage sludges, including solvent extraction techniques, heavy liquid separation of the inorganic and organic phases of sludge, and studies on sorption of metals by sludges, calcium carbonate, and other inorganic sludge constituents. The fate of metals added to soils in sewage sludges will be determined in laboratory incubation experiments. Sludge fractions obtained by non-aqueous extractions and heavy liquid separation will be added to soils and incubated for varying time periods. Metal release, CO₂ evolution, and N transformations will be determined at selected time intervals. Isotopically exchangeable Zn, Cd, and Ni will be measured to evaluate the reversion process of metals in soil.

804568

The overall objective of this project continues to be the bench-scale investigation of sulfide (combination lime-sulfide) precipitation with soluble and sparingly-soluble sulfide salts and of charged membrane ultrafiltration with commercially-available, negatively-charged, non-cellulosic membranes for treating specific waste streams from the copper and zinc industries. The specific waste streams (containing As, Se, Cd, Zn, Fe, Pb, etc) include acid plant waste-scrubber waste and the overflow from lime-settling operations.

Continuous flow, bench-scale sulfide precipitation studies will include the use of Na_2S and Fe S (or pyrites). The sulfide dosage requirements and predictions with varying waste compositions and optimum precipitate settling conditions will be established. Charged membrane ultrafiltration will be evaluated in terms of high water recovery, maximum extent of metals removal with single to multiple-pass water recycle, and the possibility of obtaining 98% water recovery by an intermediate settling step.

The studies conducted during the first budget period show very promising heavy metals separation in terms of meeting BATEA standards and/or for in-plant water reuse.

804571

Because of growing public concern over the occurrence of trace amounts of various organic chemicals in the area potable water supply, the Jefferson Parish Water Department has recognized the need for a more efficient and reliable treatment process designed to remove such contaminants.

The Mississippi River is the sole raw water source available to the Jefferson Parish Water System. Therefore, since the use of another less polluted source is impossible, the Department is faced only with seeking out new methods for removal of trace levels of organic contaminants.

One such method offers the most promise of effuting trace organic compound removal. It is the use of granular activated carbon (GAC) filtration. GAC filtration will be thoroughly studied in quantitative terms and in terms of cost effectiveness during the course of this study.

Of all municipal-related pollution abatement problems, the most significant in terms of cost and technical complexity is storm and combined sewerage system overflow loadings. According to recent estimates, the costs of implementing measures to control storm water runoff and combined sewer overflows are approximately \$261 billion.

Application of management concepts to sewer systems can enhance the usefulness of existing combined sewerage systems, particularly during wet weather conditions, and thus reduce the level of required expensive structural controls. One aspect of sewer system management is a vigorous troubleshooting and maintenance program utilizing conventional means to cleanse troublesome deposition locations.

The concept of depositing-solids control in sewer lines, although widely used around the turn of the century as a maintenance practice, is still only occasionally viewed as a viable pollution control alternative for combined sewer systems. Much theoretical but little applied research has been performed to develop an understanding of the mechanisms of solids deposition. Even less work has been performed to develop and quantify uniform criteria for flushing sewers.

Ozone is a common contaminant of urban atmospheres, developing with photochemical smogs, and at present, occurring at a maximum concentration in the range of 0.5 - 1.0 ppm. At this concentration, some humans develop symptoms which resemble those of an asthmatic attack though they have no previous history of respiratory disease. The symptoms of asthma are generally considered to result from the degranulation of pulmonary mast cells and the sequential release of a mixture of vasoactive mediators consisting of histamine, slow reacting substance of anaphylaxis (SRS-A), prostaglandins E_2 and $F_{2\alpha}$, and other substances depending on the animal species. Young, adult male rats (180-200g) will be exposed, under controlled conditions, to graded concentrations of ozone for various periods of time in order to find the minimal concentration (ppm ozone and hours of exposure) which will produce quantitative changes in the following parameters: histamine forming capacity; release of histamine, SRS-A, prostaglandins E_2 and $F_{2\alpha}$; the ability of the lung to take up serotonin and/or norepinephrine, to convert angiotension I to angiotensin II, to inactivate bradykinin, and to convert cortisone to cortisol. If changes in these parameters are observed, it is proposed to treat the experimental animals with suitable drugs to prevent the release of specific mediators.

804614

- 1) **Objectives:** Evaluate soil and sewage sludge factors which affect plant uptake of heavy metals (cadmium, zinc, copper and nickel), elucidate mechanisms of sorption and release of these metals in sludge-amended soils and develop laboratory methods of determining heavy metal bioavailability.
- 2) **Approach:** Greenhouse and field trials are being conducted to evaluate plant uptake of metals. Laboratory research using chelating resins and isotopes are being conducted to evaluate retention mechanisms and develop laboratory tests.
- 3) **Progress:** Results of an extensive greenhouse experiment indicate commonly determined soil properties do not relate to heavy metal availability. Further, the often suggested DTPA extraction on a soil test appears to offer little promise as a method for predicting metal bioavailability. A method using chelating and weak cation exchange resins has been developed to provide sorption isotherms under controlled pH and solution metal concentrations. Neutron activation analysis indicated that commonly used digestion procedures for sludges give incomplete digestion. The field data indicate that at recommended sludge loading rates, little Cd accumulates in corn tissue or grain.

804636

The federal water pollution control laws encourage the application of sewage sludge to agricultural land and for other beneficial uses as the preferred solution to this ultimate disposal problem. Because of the high capital and energy costs of reliable sludge treatment and disinfection, less costly and simpler treatment alternatives are being sought. Thermophilic aerobic digestion of sewage sludge offers promise of improving sludge management at a low cost. The possibilities of using the heat release during microbial oxidation of the sewage sludge to autoheat the waste liquid sludge has been considered by a number of investigators. The heat of oxidation of organics appears to be capable of autoheating sewage sludge at 95 to 97% water content to the thermophilic range only if the aeration system can achieve an oxygen transfer efficiency greater than 15%. Since most conventional aerators achieve transfer efficiencies less than 5%, it has been suggested that aeration with oxygen enriched air or pure oxygen would be necessary to support the concept of autoheating. Presently, a full scale commercially available unit being operated by Cornell University has been shown to be able to achieve thermophilic temperatures with a simple air aeration system using autoheating with a mixture of a primary and secondary sewage sludge. Continuation of this study will document the limitations of the process and effectiveness of pathogen kill obtained with the autoheated temperatures.

804641

This work is intended to evaluate various factors influencing the effect of environmental pollutants with particular emphasis on trace elements.

Special attention will be paid to differences in absorption, distribution and retention in relation to age, to the estimation of critical organ in the immature, to differences in toxicity due to age, to late effects caused by infant exposure and to nutritional factors and deficiencies as influencing trace element metabolism and effects.

Most of the experimental work is going to be performed on rats using radioactive isotopes of trace elements for studying various metabolic parameters (i.e. ^{115}Cd , ^{203}Hg , ^{203}Pb , ^{59}Mn etc.). Stable trace elements are going to be used as additives to different diets to evaluate the effect of chronic exposure and interaction of essential and toxic trace elements. The experiments on humans are envisaged for a later stage.

These investigations are expected to provide a better basis for evaluating the effects of environmental pollutants in the young.

804660

The goal of the proposed effort is to develop a hydrophobic substance to mitigate pavement ice adhesion which will be cost-effective as compared to conventional methods. Specific objectives are: a) the traffic paint employed as a binder in one of the formulations from the initial effort will be improved, b) the concentrations of the active ingredients in two coatings involving multiple components will be optimized, c) while the basic goal of a coating to be applied to existing roadways will be retained, the fundamental concepts of an ice release material will be further investigated by a brief study of the incorporation of otherwise unsuitable materials into 2.5 cm (one inch) asphalt overlays, d) the functionally superior coatings resulting from the technical work here described will be tested on a full scale traffic simulator under varying monitored conditions of tire-surface interface.

The purpose of the proposed research is to measure the capacity of selected clay minerals and waste coal chars to adsorb hazardous organic compounds from pure aqueous solutions of the compounds and from manufacturing wastes that contain the compounds. The adsorption will be measured as a function of pH, concentration of adsorbate and adsorbent, and time. The adsorption of families of compounds will be measured to systematically determine the mechanisms responsible for adsorption. To aid in a systematic evaluation of mechanisms responsible for attenuation, a comprehensive critical review of literature will be undertaken. The various adsorbents tested will be evaluated as to their potential usefulness as liners for landfills accepting hazardous organic-bearing wastes.

The results of this study should allow predictive models to be developed that will aid researchers and regulatory agencies in prediction of adsorption behavior and the relative pollution hazards of untested compounds with similar structures.

Eutrophication is the problem of excessive biological production as a result of increased input of limiting nutrients and dominance of undesirable species. In order to control eutrophication, therefore, it is essential to understand the relationship between nutrient concentrations and phytoplankton growth. This study will investigate comparative kinetics of nutrient limited growth and nutrient uptake (phosphate & nitrate) in 9 predominant species of phytoplankters in the Great Lakes using continuous culture methods. Emphasis will be on the control of growth rate by intracellular nutrient pools and the effects of pools on nutrient uptake. Also investigated will be all relevant kinetic constants. In addition, the effects of light and temperature on the kinetics will be studied. Since eutrophication process frequently involves the transition between P & N limitations, N-P interaction on growth rate and nutrient uptake and optimal cellular N/P ratio will be investigated. Sinking is a major factor in determining the dominance of a certain species. Relative sinking rates of the major phytoplankters, therefore, will also be determined as a function of nutrient limitation, light intensities and temperature.

If fabric filters can be made to operate at higher than conventional velocity, a proportional reduction in filter size and initial cost will be possible, making these efficient collectors attractive for many applications where they are not currently used. For example, a high velocity filter operating at a superficial filtration velocity of 25 cm/s (air to cloth ratio of 50 cfm/ft²) need be only 10 to 25 per cent as large as a unit operating at conventional velocities.

The objectives of this project are: (1) to study the practicality of high velocity fabric filtration, (2) to investigate the phenomena which limit effective high velocity operation, and (3) to develop mathematical models to interpret and predict fabric filter performance. These objectives will be met using experimental work with a three bag pilot scale filter cleaned by the pulse-jet principle, and theoretical work to describe filter performance mathematically.

Restoration consists of construction of an outlet to lower the lake level after large storms. Topsoil and less permeable soils will be removed to allow improved recirculation into the groundwater system. The lake will be drawdown to allow desiccation and consolidation of nutrient laden sediment. Settling ponds are to be constructed so runoff from the watershed can be collected and treated. Recirculation and aeration is proposed for re-establishing a fish population.

Objectives

1. To evaluate the effects of blending two or more waters of different origin and inorganic chemical content in public water systems as related to consumer acceptance and consumer costs directly attributable to water quality.
2. To quantify corrosion rates and calcium carbonate deposition tendency in dynamic water systems before and after blending in order to develop control measures to minimize deterioration of water system facilities and household plumbing.

Approach

Data will be gathered on eighteen water quality parameters to measure changes in chemical composition related to corrosion and stability, dissolution of metals from water system facilities and household plumbing, and deterioration in quality with respect to turbidity, color, and esthetic acceptability at the consumer tap.

Current Plans

The EPA Mobile Water Quality Research Laboratory will be deployed at selected sites within the service area of The Metropolitan Water District of Southern California where imported waters from the Colorado River and California Aqueducts are blended within its distribution system or mixed with local groundwater sources of its member agencies. Chemical and physical testing will be performed continuously for periods of 48 hours or longer with an on-board computer to take and store data which will be transferred to MWD's computer center for statistical analysis and xy (concentration vs. time) plotting.

804710

A one year study for the removal and recovery of fluoborates from electroplating waste streams using ion flotation is being carried out. The basis for this study are the results of a preliminary investigation where it was shown that over 90 percent of the fluoborate may be removed from a plating waste stream sample using the acetate salts of n-alkyl amine surfactants as the flotation agent.

The goals of the investigation will be to optimize the ion flotation process for removal of the fluoborate, breaking of the resulting foam, process development for recovery of the surfactant and the fluoborate and a pilot plant design for on-line evaluation.

The two distribution systems of Salem and Beverly would be studied along with their common source by measuring various microbiological, chemical and physical parameters to help determine if certain criteria should be used in measuring water quality. The information obtained would be cross matched to determine if there was a significant correlation between the data gathered. The microbiological tests performed would be the standard plate count, coliform enumeration and identification. The chemical tests would consist of pH and chlorine measurements while the physical parameters of turbidity and temperature would be measured. Special attention would be paid to the relationships between the level of turbidity vs the standard plate count and the standard plate count vs coliform count. Also, care would be taken to identify organisms that are able to grow on the media of the standard plate count and coliform test so that it could be determined what organisms are competing for the same nutrients on the plates and in the distribution system. With all the tests and identifications performed it could then be determined, one, how effectively the coliform test is performing; two, whether the turbidity levels affect the general microbial and coliform populations; three, whether the new identification procedures could be used effectively by water laboratories. This basic information could be used to determine whether or not standards should be set and if they should be, then what level should the standards be set at.

"Restoration Analysis and Rehabilitation of Medical Lake"

Monthly and semi-monthly physical, chemical and biological parameters will be determined at two-meter intervals from the surface to the bottom of the deepest portion of the lake. With this information, a determination will be made of the concentration of aluminum sulfate needed to precipitate the available phosphorus in the lake. The aluminum sulfate applications will be made soon after the ice melts in the spring and again at the height of the water stratification in early fall.

The algal-meander system utilizes shallow stream algal growth to treat lead-zinc mining and milling wastes. The first year of the project has been spent in developing very rapid screening techniques to determine which algal forms remove metals and under what physical conditions. Principal objectives in the second phase are a) to scale up algal-meander models from microculture to laboratory pilot plant; b) to determine feasibility of continuous removal of metal and organometallic compounds from wastewater; c) to develop kinetic equations for heavy metal and organometallic removal by algae; and d) to examine the feasibility of replacing living algae in the meander systems with dried algae, natural products or synthetic materials.

The approach will be to use continuous flow laboratory models with defined algal population and feedstock containing known concentrations of heavy metals and/or organometallics. From analyses of the effluents, the adsorption kinetics can be calculated and developed into design criteria for full size systems. Factorial combinations of metal type, algal type, time of exposure, temperature, presence of organic pollutants, etc., can be evaluated. This information can be used to improve the design of algal-meander systems, to extend their use for industrial wastewater treatment, and to achieve recovery of useful materials from waste.

Photochemical oxidation of nitric oxide followed by aqueous scrubbing of the reaction products is considered an attractive near term control technique for coal field utility and industrial boilers. The technical and economic limits of the process will be evaluated in this study. The work is particularly important due to the increasing reliance on coal and the inherent limitations of combustion modification techniques for NO_x control.

The specific objectives include the determination of the product quantum yield in both the far ultraviolet band of 1800-2000Å and in the middle ultraviolet band of 2000-3000Å. These parameters will serve as a meaningful indication of the oxidation efficiency of the mechanisms under various physical conditions. The product quantum yield values can be easily translated into energy cost estimates.

A nested continuous stirred tank reactor system (CSTR) has been selected as an optimal design for accurately determining product quantum yield. A simulated stack effluent is irradiated in a commercial quartz 1 liter CSTR which is mounted within a much larger CSTR.

Product analysis is done using a chemiluminescent NO_x analyzer (TECO Model 10A) and a Pulse Fluorescent SO_2 Analyzer (TECO Model 40). The possible presence of aerosol is indicated by a Condensation Nuclei Counter (Environment One). A millipore filter will be used to collect any aerosol formed for subsequent analysis. Nitrogen and sulfur balances will be attempted.

1. Objectives: Organics in water and sediment will be analyzed. Emphasis will be placed on the development of techniques to fingerprint oil spills in water and other bodies (marine life, sediments) which have been exposed to crude oil and petroleum products. A general method will be developed to distinguish between indigenous hydrocarbons and organics which have been introduced artificially.
2. Approach. High resolution gas chromatography with glass capillary columns and multiple detectors will be used. At least 3 sets of characteristic patterns will be developed for each sample. These will include a general profile (FID) and chromatograms which are produced by a nitrogen sensitive AFID and a sulfur sensitive FPD. The chromatograms will be treated by pattern recognition techniques. Complete separation of critical areas will be accomplished using a dual oven/two dimensional gc with two capillary columns.
3. Current Plans and Progress. A two dimensional gc has been successfully tested. Selected components or groups of substances are switched from the first gc into the second instrument for further resolution. Switching is effected by Dean's switches with off-line solenoid valves. An electrical heating device is presently installed which will allow the temperature of the intermediate trap to be raised from -100°C to +280°C in 20 msec or less.

The detection and location of water levels, water pockets, voids and various other discontinuities between different layers of earth or rock is critical in insuring the performance and safety of earth dams. Such underground anomalies are particularly undesirable in the earth dams and dikes that contain hazardous materials since these relatively small embankments are generally not engineered or constructed in a rigorous and professional manner.

One possible technique for detecting and monitoring such faults and weak areas is the use of microwaves. By beaming continuous or pulsed microwaves at the dike and recording the return signal as it is reflected from the anomaly, the location, type and depth of faults can be determined. A literature search (technical, equipment, legal and safety) will be undertaken and a number of laboratory experiments will be performed to assess the practicality of using microwaves for the non-destructive assessment of dike stability. Basic soil properties such as dielectric constant, conductivity, attenuation, phase shift, and velocity, will also be determined.

The final result of this project will be the detailed specification for a inexpensive, mobile, microwave unit (with known limitations) to determine underground water, irregularities, and discontinuities in small earthen dikes.

804764

The primary goal of the study is to identify the intermediate and final products formed when aromatic hydrocarbons are irradiated with oxides of nitrogen under simulated atmospheric conditions.

804765

Project is threefold; increase water depth, reduce sedimentation and reduce nutrient inflow. This will be accomplished by dredging, implementing "best" land use management practices to include stream bank protection and stabilization program.

804768

Restoration Plan: Selectively dredging 300,000 cubic yards from those areas where sufficient organic sediment exists to promote growth of water milfoil. Diversion of the inflowing stream in the upper northwestern part of the lake. Finally, application of an herbicide to control the growth of water milfoil to favor more desirable native plants.

The objectives of the proposed investigations are the identification and quantitative determination of the organic and inorganic arsenic compounds which might be present in drinking water supplies. The samples will be selected and collected by EPA and shipped to Texas A&M University. In addition, all other substances dissolved and suspended in the water samples are to be determined. Special attention is to be given to the differences between the chemical composition of the various water samples to elucidate possible synergistic interactions between compounds as they might relate to cancer or other illnesses.

Standard methods of water analyses will be employed for the determination of dissolved and suspended solids. Arsenite and arsenate will be quantified by polarography, reduction to arsine and determination of the volatile compounds by plasma arc emission or conventional GC-detectors. Organic arsenic compounds will be reduced to volatile organic arsines and/or organyliodoarsines and detected by GC-techniques and mass spectrometry. Neutron activation, atomic absorption and X-ray fluorescence will be used to determine the total arsenic content. ESCA techniques will be evaluated as a tool for speciation of arsenic compounds.

Thus far five water samples have been analyzed. The arsenic content ranged from 0.7 to ~ 7 ppm. The arsenic is present in most of the water samples mainly as arsenite and arsenate. The analyses are now being repeated with carefully collected and preserved samples with special attention to organic arsenic compounds which might be present in low concentrations.

The Environmental Protection Agency has contracted for the construction of a pilot plant coal gasification-gas cleaning test facility at North Carolina State University, to be operated by faculty and staff of the Department of Chemical Engineering. The facility consists of a continuous fluidized bed gasifier, devices for removing particulates, condensables, and soluble matter from the raw synthesis gas, and an acid gas removal system. The gasifier operates at pressures up to 100 psig, has a capacity of 50 lb coal/hr, and can run with either steam-O₂ or steam-air feed mixtures to produce roughly 25 SCFM of make gas. The AGRS is modular in design, so that alternative absorption processes may be evaluated with a minimal amount of system modification being required.

The overall objective of the project is to characterize completely the gaseous and condensed phase emissions from typical coal gasification-gas cleaning processes and to determine how emissions depend upon various process parameters. Initially, this will require the determination of the fate of selected trace elements and hazardous substances and the development of the necessary sampling and analytical strategies.

804813

The objective of the three year study is to assess in vitro mutagenic/carcinogenic potential of organic substances in renovated wastewaters and attempt to identify the fractions/chemicals responsible for the action. Wastewater renovation plants representing a wide variety of treatment methods - natural sand beds, physical-chemical, and biological, are selected to enable correlation of the data on mutagenicity/carcinogenicity to the treatment technology. The study will provide information on health hazards from reclaimed wastewater for potable use and assist in setting priorities for in-depth toxicological testing.

First year was devoted to assessment of the mutagenic/carcinogenic potential of unconcentrated secondary effluent- and advanced wastewater treatment effluents utilizing Salmonella and yeast mutagenesis assays. Secondary effluent, and lysimeter samples collected from different depths of the sand beds at Lake George AWT Plant showed no mutagenicity. Wastewaters spiked with known mutagens revealed that mutagens can be detected in wastewaters without significant interference from the components of wastewaters with the bioassay system and/or with the activity of mutagens. Secondary and AWT effluent samples collected from Bay Park Water Reclamation Plant exhibited weak mutagenicity in Salmonella strain TA-1535.

In the second year, concentration of organics from secondary- and AWT effluents and analysis of the concentrates for mutagenicity/carcinogenicity using in vitro bioassay procedures shall be undertaken. Since no single concentration device can be used to remove all organics of concern, a variety of concentration techniques - polyurethane foam plugs, XAD-2, liquid-liquid extraction, and thermal extraction for low-molecular weight volatile organics, shall be used. To determine if mutagens/carcinogens are present in the form of conjugates, concentrates will be tested after acid- and enzyme hydrolysis.

804815

The objective of the proposed project is as follows: To reduce the impact of rapid urbanization on the water quality of Jackson Lake. The restoration of Jackson Lake includes the utilization of a combination of settling basins, some of which are already in existence but have not been maintained or otherwise may have to be modified, channel modifications, and the establishment of a final high water biofiltration marsh.

804819

Objective. Evaluation of overall cost-benefit impacts of charging solid waste costs at the point of production.

Approach. (1) gathering the relevant materials and preparing a draft summary (2) discussion and evaluation of the summary with well-informed representatives of the various potential user categories, and (3) preparation of a revised final report taking into account user comments and criticisms.

804834

The purpose of this project is the development and application of a membrane electrode system capable of in situ measurement of dissolved ozone. There is a pressing need for such a sensor system, especially in view of recent interest in the utilization of ozone as an alternative to chlorine in water and wastewater disinfection and treatment processes.

An inherent part of this study is the development of a process controlled ozonator for water treatment applications in which the rate of ozone generation is controlled by membrane electrode measurement. This system will be tested on a pilot plant scale and in water supply and waste treatment plants.

Furthermore, the membrane electrode under investigation is inherently capable of measurement of ozone in gaseous and nonaqueous media. The feasibility of these particular applications will also be investigated.

Previous work by the principal investigator resulted in the development of steady state and pulse voltammetric membrane electrodes for dissolved oxygen measurement.

Preliminary investigations on the development of an ozone membrane electrode resulted in a prototype capable of detecting aqueous ozone in the part per billion range, in the presence of oxygen. This electrode system has unique design characteristics and membrane material different from the oxygen membrane electrode.

Further work is needed for the (a) optimization of the electrode design and testing different types of membranes, (b) development of compact, portable, circuitry package for signal processing, (c) determine the electrode performance characteristics in the field, and (d) develop and field-test the process controlled ozonator.

804836

A program to investigate the pyrolysis of agricultural residues and feedlot wastes in a steam atmosphere is to be done. The program is motivated by the evident need to upgrade the energy value of organic wastes for them to become a nationally significant fuel resource. Hydrogen produced from solid wastes by steam pyrolysis could be used to meet a portion of the Nation's natural gas demand. Experimental work on the kinetics of steam pyrolysis is needed to design a practical reactor system and to establish the regimes where minimum levels of environmental pollutants are produced.

The research program outlined in this effort will complete the investigation of the effects of diverse parameters, e.g., heating rate and ultimate temperature, particle size, reactor residence time and pressure on steam pyrolysis. In addition, catalysis of the pyrolysis reactions and effects of trace constituents of the waste on catalysis will also be studied. Mathematical models based on differential equations describing the rate processes will be developed when appropriate. The research program is aimed at determining the optimal conditions for the production of a synthesis gas (composed primarily of H_2 , CO, and CO_2) from organic wastes by steam pyrolysis. In order to achieve this goal, yields of char and liquid products will be minimized. Ultimate pyrolysis temperatures will also be kept as low as possible, but other conditions will be treated as true variables in the optimization process.

Results from this research will facilitate the design of a continuous, small-scale chemical reactor primarily for waste gasification, though some waste liquefaction information will also result.

804854

The primary objectives of this investigation are:

1. To establish the feasibility of upgrading existing primary sedimentation plants to meet the secondary treatment requirements of PL 92-500 through the installation of rotating biological contactors (RBC's) in the upper half of existing primary clarifiers and a false floor at mid-depth to form a lower secondary clarification zone.
2. To establish the degree of pretreatment and supplemental oxygen supply (if any) necessary to successfully operate an RBC system in this mode.
3. To evaluate the effects of climatic, diurnal flow, and total daily load variations on process efficiency.
4. To establish design parameters and capital and operating costs for the application of this upgrading technique to maximize the use of existing tankage and facilities at other existing primary sedimentation plants.

Operation of Edgewater's converted primary clarifier test module (0.5 mgd+) over the past 2 years has demonstrated to the Borough the potential of the RBC/false floor concept to upgrade performance to secondary treatment levels. However, the existing installation lacks certain control refinements which are necessary to determine limiting conditions of the process as related to hydraulic and organic loadings and diurnal flow variations. It is the intent of this project to provide for the installation of equipment to accurately monitor and control flow and to efficiently remove grit and trash, to provide for the collection and analysis of flow proportional 24-hour composite samples, and to establish and carry out a systematic procedure for evaluating the primary clarifier/RBC test system over a meaningful range of loading conditions and for optimizing process results. The concept will be analyzed on a cost effective and treatment efficiency basis, especially as to its applicability to similar primary plants throughout the country.

The objectives of this project are: 1) to determine the applicability of the Bellar-Lichtenberg methods for volatile organics analysis (VOA) in water to a variety of types of compounds and 2) to investigate the variations in analytical precision that are induced by modifications in the hardware, software, and sample-handling procedures.

Variables to be investigated include: 1) sample size, container type, and the presence of head space; 2) temperatures and times of storage; 3) methods of sparging samples, trapping efficiencies, and desorption methods; and 4) instrumentation variables such as column packing, column geometry, heating rate, and gas flow rate. Once an optimum procedure for sampling, handling, and analysis has been devised, its applicability to a variety of types of organic compounds will be investigated. Groups of compounds to be studied include ethers, alcohols, mercaptans, amines, esters, nitriles, and a variety of aromatics, including simple, complex, halogenated, and conjugated types.

The project is to be developmental in nature and is designed for a one-year period. The work will be entirely bench-scale experimentation, and the results will be statistically analyzed in an attempt to identify those variables that significantly affect the results of the VOA. This work will identify areas requiring additional research, and hopefully be instrumental in devising a standard method for the sampling, handling and analysis of volatile organic compounds that may possible be in drinking water.

This project is to write the second of two volumes on the toxicology of pesticides. The first of these volumes, published in 1975 by Williams and Wilkins, deals with the general principles of toxicology and with what might be called the epidemiology of pesticides poisoning in man and animals. The second volume will deal with groups of pesticides and with individual compounds within these groups. The two volumes were planned from the beginning as separate parts of a single unified work. This work may be viewed as an expansion of my Clinical Handbook on Economic Poisons. Although the Handbook enjoyed extensive use in this country and abroad, it contained almost nothing to orient the reader to general toxicology or to the overall picture of pesticide toxicity and storage. Hopefully, that need has been filled by my book, Toxicology of Pesticides, now published. It remains to present that part of subject to which nearly all of the Handbook was devoted. Attention will still be given almost entirely to compounds that have been studied in man, mainly in connection with occupational exposure or accidental or intentional poisoning, but surprisingly often in connection with planned experiments or therapeutic uses. Special attention will be given to clinically useful information including minimal dosages that have proved dangerous and maximal dosages that were tolerated. No attempt will be made to cover animal studies completely, but those that might contribute to an understanding of poisoning or to its treatment will be reported.

804895

This project would determine the feasibility of using hypolimnetic aeration and nutrient inactivation as a combined treatment to arrest and mitigate the effects of eutrophication in a reservoir.

Lafayette Reservoir is a 126 acre, 4200 acre-foot reservoir in the San Francisco Bay metropolitan area. The reservoir is currently used for recreation and as a standby domestic water supply.

Aeration of the hypolimnion would occur for seven months in each of two consecutive summers. Aluminum sulfate would be applied to the reservoir twice during the first summer - first to the surface layer and then through the aerator to the hypolimnion. The treatments are expected to remove nutrients from the water and sequester them in the benthic sediments.

804902

The project will use pilot plant studies of chlorination disinfection with chlorine dioxide and adsorption of organics by granular activated carbon to determine their efficacy in removing specific organics from drinking water.

804914

The project is designed to improve the water quality of Lake Mary Ronan by restricting nutrient loading to the lake by fencing the cattle in the watershed away from tributary streams and the lake. Reducing lake nutrient levels is expected to reduce algal growth and improve oxygen levels in the hypolimnion.

804916

A program is underway to develop a new FT nmr spectrometer system of unprecedented sensitivity for a large class of applications dealing with biomolecular structure and function. The spectrometer uses a wide base 3.5 Tesla superconducting solenoid and is based on 3 rf synthesizers. Essentially all magnetic nuclides will be observable in 15 to >30 mm sample tubes.

Several new applications are being investigated for the new instrumentation; studying environmental toxic materials with emphasis on elucidation of toxin-induced changes in biomolecule structure and function. One project will utilize variable frequency ^{13}C relaxation measurements to elucidate the form of interaction between organic toxins and model membrane systems. Another project involves specialized synthesis of short "native" DNA's and subsequent nmr studies of heavy metal toxin binding and intercalation into the DNA structure. A third application utilizes ^{31}P nmr and ultralarge sample tubes to speciate organophosphorus pollutants in natural waters. The largest (35-50mm) sample tubes will also be used in an attempt to directly observe toxin metabolism/degradation by living cells, using ^{31}P nmr and ^{13}C and ^{15}N nmr (with isotopic enrichment).

The purpose of this project is to assess the environmental impact of wastewater contaminants originating from the production of synthetic fuels from coal, and to evaluate alternative wastewater treatment technologies for the control of these contaminants. The project is carried out in several phases over a 5-year period consisting of (a) a literature review and survey of pilot- and full-scale coal conversion facilities to identify specific contaminants which might be found in coal processing wastewaters, (b) a study of the biodegradability of selected organic constituents from such wastewaters including an assessment of the aquatic impact of these constituents and biodegradation products, (c) biological and physical-chemical treatability studies of selected organic constituents and identification of the residuals following treatment, (d) animal toxicology studies to evaluate the potential health effects of those wastewater components for which sufficient information is not available in the literature, (e) treatability studies of composite synthetic and real coal-processing waters including analytical characterization and aquatic impact assessment of the treated waters, and (f) development of design criteria for continuous treatment of wastewaters from coal-conversion facilities.

Special terrestrial compartmentalized microcosms are used for the study of the ecological and biological effects as well as the interaction of pesticides in a soil-plant and animal ecosystem. The major objectives are to investigate

1. The biological effects and interactions of pesticides on plants grown in these microcosms as affected by a number of environmental conditions such as rain, temperature, air humidities, plant pathogens, soil types, and the presence of residues of different groups of pesticides in the soil.
2. The fate of a ^{14}C -insecticide in the soil of the terrestrial part of the microcosm as affected by various environmental conditions.
3. The qualitative and quantitative composition of run-off water from the soil.
4. The effect of pesticide contaminated run-off soil water on biological systems in water as affected by various environmental conditions.

804925

Classical erosion control methods used for non-irrigated agriculture will be evaluated for their cost-effectiveness in nonpoint source pollution control. The project will include a conference entitled Best Management Practices for Agriculture and Silviculture.

804926

Improvements in fabric filter performance obtained by control of elemental fiber geometry, fabric construction, or applied electric fields are believed to depend on differences in the structure of the deposited dust layer or cake. The object of the proposed research is to identify those features of the different dust cakes which can account for differences in filter performance. This will be accomplished by scanning electron microscopical studies using known techniques and possibly new techniques to be developed in the course of the project. On the basis of the information so acquired, improved fabric constructions will be developed in which the tendency to deposit dust cakes with desirable features will be maximized.

804946

A current trend in coastal states is to impose stringent disinfection standards on treated wastewater for the protection of shellfish areas. Several states have also imposed very stringent disinfection requirements to protect inland waters that are utilized for water recreation. Ozone has surfaced as the most promising alternative disinfectant to chlorination; however, research to date has focused on achieving disinfection standards well above those proposed/imposed for specific receiving streams. This project will be capable of ozonating a side stream from a conventional activated sludge treatment facility to determine ozone requirements for achieving high levels of disinfection. Facilities are also available for evaluating ozone requirements on a tertiary treated effluent. The research plan will evaluate the effect of diurnal variation of raw water on performance and disinfection reliability. Goals on disinfection are total coliforms below 230, 70 and 3 per 100 ml.

804959

In order to study the effect of carbon monoxide (CO) as an atmospheric pollutant on the development of and the physiologic responses to atherosclerosis, two models in swine will be used. In one model, coronary atherosclerosis will be induced by balloon denudation of coronary endothelium and a high fat, high cholesterol diet. The effect of carbon monoxide and platelet function on the development of the atherosclerotic lesion will be assessed a) by exposing swine to CO to attain elevated HbCO levels and b) by comparing the atherosclerotic response in normal and von Willebrand's disease swine. The response of atherosclerotic swine to stress (aortic cross clamping, anesthesia) and CO exposure will be assessed. In the other model, the effect of carbon monoxide alone in inducing pre-atherosclerotic lesions will be determined. A new procedure for studying the effect of platelet-associated von Willebrand factor in such early lesions of atherosclerosis will be applied.

804972

The project objective is to prepare a comprehensive training package, consisting of a number of audiovisual presentations and an accompanying instructional manual, which can be used by government and industry to: (1) upgrade and improve the techniques and procedures for enforcing state and Federal environmental regulations related to surface mining; (2) acquaint regulatory and production personnel with the environmental sciences, the nature, extent and relationship of surface mining environmental problems, and the basic environmental control principles and practices; and (3) explain and illustrate different uses and applications of best available and cost-effective environmental control techniques.

A format which is generic in nature will be utilized in developing the course. The use of such a format is desirable in order to facilitate course utilization throughout the varied and extensive geographic area covered by the IMCC member states. In preparing those portions of the course dealing with the control basis, emphasis will be given to basic control philosophy, principles, and practices rather than a detailed coverage of specific laws and regulations within particular states.

The Draft instructional manual is scheduled for completed in December, 1977.

804996

The final goal for this project is the correlation of toxicity in a particular ecosystem with chemical speciation and use of these correlations to determine realistic water standards. Biological activity most commonly correlates best with specific forms or species of contaminants and water quality standards would be most soundly structured on the probability of an offending species being present or available.

Three areas of activity are involved in meeting project goals:

- A. Predictive computer modeling utilizing speciation and toxicity data .
- B. Assembling a data base on speciation from literature, experiment, and estimation
- C. Collection and interpretation of toxicity data from literature and experimentation.

To date, substantial progress has been made on parts A and B.

804998

Standards and methods of concentration of precipitation components and analysis will be investigated with routine implementation as the objective.

805016

Fundamental adsorption and colloid stability theory, physico-chemical and mass transport concepts, and economic considerations will be employed to select optimum solids and conditions for an adsorption-denaturation virus removal process to be used in water treatment or wastewater treatment operations. Apparent free energies of adsorption of ^3H , ^{14}C labeled poliovirus type 1 will be measured by batch experiments on solid phases expected to have high total adsorption potentials. These values will be compared to those previously measured on low reactivity solids such as SiO_2 . Denaturation will be evaluated by looking at ratios of infectivity to count per minute in unadsorbed and desorbed virus preparations and by using rate zonal sedimentation analysis to check for viral degradation products.

A bench scale adsorption-filtration process will be designed to accommodate solid phases which appear to have the best overall applicability. This process will be tested with poliovirus type 1 using dechlorinated tap water and secondary effluent, under sterile and non-sterile conditions.

805029

The Lower Mystic Lake is a deep lake located in Arlington and Medford at the upstream end of the Mystic River. Until 1908 when a dam was constructed, the water level of the Lower Mystic Lake fluctuated with the tide. The denser salt water has been trapped in the lower depths of this lake since that time. The stratified bottom waters are anoxic, containing large concentrations of hydrogen sulfide, a toxic gas, and other decomposition products. During extremely low river flows, hydrogen sulfide is released into the atmosphere. The purpose of the project is the removal of the salt water, thereby eliminating the source of the high concentrations of the hydrogen sulfide and creating a fresh water lake with much greater recreational potential. For a period of time thereafter, the lake will be aerated to stabilize the sediments aerobically.

The MDC has considerable background information on water quality throughout the water column. Sulfides have been measured as high as 350 mg per liter, ammonia 50 mg/l and phosphorous 20 mg/l.

The project involves precipitation of hydrogen sulfide with ferric chloride prior to pumping to a nearby MDC sewer

805031

This two year study will evaluate the adequacy of clean-up procedures used following the June 23, 1976, "NEPCO 140" oil spill in the St. Lawrence River near Alenandria Bay, New York. During this budget period, the economic impact of the spill will be analyzed and the effect of the spill on mammals, waterfowl, and other aquatic resources will be determined. A final report will also be prepared describing the details of the entire study.

805036

A study will be conducted to determine the feasibility of developing a general methodology to assess the socio-economic impacts of implementing alternative nonpoint source pollution abatement controls. The study will investigate physical transfer functions; benefits of and beneficiaries from improved water quality; loading, costs, and distribution of costs; and methods of identifying and dealing with conflicts.

805047

The lake ecosystem model CLEANER will be improved for use as an environmental-planning and management tool. Mathematical representations of biologic processes will be improved, and representations of physical-limnologic processes will be incorporated. Capability for simulating stratification and horizontal heterogeneity will be greatly expanded. The model will be calibrated and validated for diverse, intensively-studied American and European lakes. It will be coupled to an existing hydrologic-hydrodynamic modeling package and will be tested for application to data-poor basins of interest to the EPA.

The overall objective of this research program is to evaluate the alveolar macrophage response in several species of animals consequent to the inhalation of standardized sulfate particulates, sulfuric acid, and sulfur dioxide (with and without ferric oxide particles). The optimum concentration of particles, particle size, and time of sacrifice of the test animals are being determined in preliminary studies. A number of measurements of the response of free cells to these particulates will be made, such as the total number and size of free cells available, viability of free cells, phagocytic capability, and other physiological and biochemical responses.

During the first year of this study, the techniques of aerosol generation were developed to generate metal sulfate and iron oxide aerosols in sulfur dioxide atmospheres. Using this methodology, groups of hamsters were exposed for four hours to sulfur dioxide gas alone and iron oxide (Fe_2O_3) aerosols alone, as well as the combination of the two. Interestingly, when hamsters were exposed to concentrations of both SO_2 and Fe_2O_3 at 50 ppm and 10 mg/m^3 , respectively, a marked reduction in alveolar macrophage endocytosis of radiocolloidal gold was observed in animals exposed to Fe_2O_3 aerosols containing small particles ($\text{MMAD}=0.15 \text{ um}$) with large surface areas. This depression in phagocytic function remained for more than 24 hours and did not appear to return to normal, control levels until 48 hours following SO_2 and Fe_2O_3 exposure. During the next budget period, we plan to further investigate the possible additive and synergistic effects of the interaction of SO_2 gas and Fe_2O_3 aerosols and also to investigate three sulfate species.

805102

The principal objective of this project is to evaluate the recoverability of coliforms from waters which have: a) high populations of non-coliform organisms; and b) high levels of turbidity due to natural mineral turbidity, hydrated oxides and organic debris. An attempt will be made to distinguish the physical interference effects of turbidity from those effects caused by the growth of competing organisms. This may be accomplished by: a) selecting turbidities which vary in their microbial content, b) selectively reducing the microbial content of a turbidity, and c) separating the turbidity from its source water and totally removing the microbial content by sterilization. The extent of inhibition of coliform recovery and the interaction of these various factors will also be considered.

A secondary objective is to determine the mechanism of inhibition. The most likely possibilities are: a) competition for nutrients, b) liberation of an inhibitory substance by the non-coliforms, and c) overgrowth of the coliforms by non-coliforms on laboratory media.

805125

The objective of this research project is to perfect an in vitro technique for the rapid screening of teratogens. The plan of approach is to analyze the effects of organ specific teratogens on the development of the embryo in vitro. Teratogens will be administered to rats on selected days of gestation and the embryos recovered 24 hours later. These embryos will be cultured for periods up to 48 hours after recovery. At the end of the incubation period the organ systems will be studied macroscopically and microscopically for signs of abnormal development.

805126

(1) Objectives: To determine if bioaccumulated organochlorides or other chemical residues play an etiological role in Reye's Syndrome by comparing levels of such toxicants in the adipose tissue, liver, brain, and possibly other tissues of victims who die of the disease to levels in a control group of children who die of other causes. Another objective is to obtain baseline data regarding the load of such persistent toxicants being carried by children in the Great Lakes area.

(2) Approach: A case-control autopsy study will be designed and a gas chromatograph mass spectrometer/computer used to identify and quantify for chemical residues including chlorinated hydrocarbon pesticides.

(3) Current Plans: Analytical techniques will be worked out. Sources of cases and paired controls found, either by pre-designating certain medical centers in the Great Lakes region or by waiting for Reye's Syndrome to occur and then arranging with pathologists in the area to provide specimens. Specimens will be shipped on dry ice to the EPA Environmental Research Laboratory, Duluth where facilities for the project have been provided. If good data is generated, the results will be published.

805144

1. Objectives -

Attempt to propagate hepatitis A virus (HAV) in all cell culture and/or animals.

2. Approach -

Unique tissue culture cell systems (spinner, ferret, gerbil) will be used and subtle effects of viral growth assayed.

3. Current Plans

- (a) Human Amnion cells in spinner culture will be infected with positive HAV material and the cells assayed for cell count, viability, nucleic acid biosynthesis, F.A. antigen and radioimmune assay activity.
- (b) New cell lines from ferrets and gerbils will be established and inoculated with HAV. After 4-5 days of incubation the inoculated cells will be superinfected with a RNA or DNA virus and viral interference documented.
- (c) Newborn ferrets will be inoculated with HAV materials and followed for evidence of infection.

805146

The basic problem to be approached is a continued assessment of the degree to which specific site binding mechanism operate in species which occupy habitats subject to heavy metal contamination in the Great Lakes. Studies are also proposed to evaluate toxic symptoms and stress levels of heavy metals on species collected from these sites and incubated in the laboratory with additional heavy metals. A cellular approach will again be used to assess these problems in order to mitigate the problems associated with bulk analysis and extraction procedures. In particular, x-ray microanalysis will be utilized to locate intracellular binding sites and morphometric techniques will be used quantitatively measure cellular changes occurring with heavy metal exposure.

Research conducted to date has demonstrated that heavy metal binding with polyphosphate occurs in the field and in laboratory cultures of some diatoms. It also appears that heavy metal exposure may cause a proliferation of cellular membranes at minimal doses.

805151

This proposal outlines a project aimed at facilitating the dissemination of information pertaining to animal production's impact on environmental quality. This will be accomplished by searching the literature, abstracting pertinent publications, publishing water-related abstracts in Water Resources Information Abstracts, and submitting a cumulative bibliography of abstracts to the Environmental Protection Agency for publication at the end of each budget period. The publications to be abstracted will be examined for the following topics: (1) The environmental impact of animal production activities on water, ground water, air, soil systems, health, and aesthetics. (2) Feedlot, confinement pen, rangeland, and pasture land management, including animal waste management; the use of chemical fertilizers, manures, green manures, and sewage sludge in conjunction with animal production areas; the use of pesticides in conjunction with animal production areas or animal production-related areas; and pollution effects of crop residues, soil losses and sediments production from animal production areas to animal production-related areas. (3) Legal, economic, and social constraints. (4) Research and development. The project staff will maintain a file copy of all articles which appear in the bibliography. Upon request to the project staff, users will be supplied a copy of individual articles at cost.

805169

Acute infectious nonbacterial gastroenteritis is characteristically an epidemic disease but it also persists in an endemic form that is responsible for sporadic cases or localized outbreaks, posing a major recurring problem in public health.

The major objective of this project is to assess the contribution of parvovirus-like agents to environmentally transmitted enteritis. We plan a two-fold approach to the problem. One is to design, develop and test a sensitive assay method for the detection of these agents in stool and water specimens without the necessity of propagating the viruses. The second approach is to cultivate the viruses in question in vitro utilizing methodologies that have proven successful for optimal growth of other known parvoviruses.

Successful completion of this project will result in 1) a reliable method for the rapid diagnosis of this type of viral enteritis and 2) a rapid way of testing environmental samples (e.g. large quantities of water) for the presence of enteritis agents.

805174

(1) Objectives -

- a) To determine the degree of added risk of communicable disease incidence among residents of agricultural communities (kibbutzim) practicing wastewater utilization as compared to those not utilizing wastewater.
- b) To determine whether the added risk is associated with sprinkler irrigation with wastewater and influenced by proximity of irrigated areas to residential zones and dominant wind directions.
- c) To determine whether the degree of added risk is associated with the degree of wastewater purification and can be reduced as a result of improved treatment including disinfection of effluent.

(2) Approach -

Retrospective disease data from some 80 kibbutzim (collective agricultural settlements) practicing sprinkler irrigation with partially treated non-disinfected oxidation pond effluent will be collected and compared with disease data from 130 control kibbutzim not practicing any form of sewage utilization. Environmental factors such as distance from sewage irrigated field, wind direction and degree of wastewater treatment will be studied.

805185

The basic overlying goal of the Alluvial Valley Floors project is to define which physical and biological features of alluvial valley floors are of critical importance in the hydrologic cycle and to discover the interrelationships which would help define potential impacts of mining on that cycle. The specific objectives of this study are: (a) investigate and describe those hydrologic and geologic characteristics of alluvial valley floors which are most critical in the hydrologic cycle including the hydrologic interactions among the surface waters, the ground waters, soil moisture, infiltration and water quality; (b) investigate the stratigraphic relations of stream deposits within alluvial valley floors; (c) identify the soils in the alluvial valley floors, assess the salinity of each soil, appraise each soil for its effectiveness for subirrigation, and use soil data to help assess the present land productivity determining where productivity is dependent on subirrigation or surface irrigation, determine if soil and alluvium disturbance will affect the salinity or productivity of the soil and water quality, and determine if disturbance of soils and overburden may alter infiltration and other physical properties of the alluvial valley; (d) define a concept for alluvial valley floors; and (e) provide information to help state regulatory agencies in formulating recommendations and/or guidelines.

805189

The objective is to demonstrate safe beneficial use of wastewater sludge as a soil amendment on agricultural land. Institutional arrangements to permit objective evaluations and decisions by both rural and urban residents will be demonstrated. The effect of proper application and management of a land application of sludge on public health and the environment will be determined.

Four communities in Ohio that already dispose of sludge by spreading it on farm land will supply sludge for application to selected farms in a carefully planned and managed system. In addition to sludge application on fields, sludge will be applied to carefully selected plots for measurement of its effect on yield and composition of crop, composition soil, and composition of ground and surface water. An epidemiological study of livestock and people who come in contact with sludges will measure the health effects of sludge spreading.

805215

In several instances the source of acute giardiosis in man has been traced to water supplies, but the source of the water contaminations is rarely discovered. Wild or domestic animals often have been suspected of contaminating the water. Giardia has been found in several free-ranging mammals but it is not known if these will cause infection in man. Therefore, isolates of human Giardia lamblia will be given to as many species of wild and domestic animals as possible (at least 22 species and possibly as many as 33). Additional cross transmission studies will be done by infecting as many of the 33 species as possible with Giardia recovered from any free-ranging or domestic animal. As human Giardia will infect dogs, Specific Pathogen Free (SPF) beagle puppies will be used to screen all positive species. If the puppies become positive for Giardia, it will be assumed that animals Giardia will infect humans. Subsequent proof (human infections) must be undertaken by a medical school or the National Center for Disease Control or the Environmental Protection Agency.

805223

A conference will be convened in March 1978 on control and prevention of hazardous material spills. The topics to be presented include:

- Legislation and Regulations
- Clean-Up Systems
- International Programs
- Contingency Planning
- Prevention
- Government Policies and Programs
- Personnel Safety
- Spill Retrieval Data Systems
- Ultimate Disposal
- Detection-Monitoring-Reporting
- Response Capabilities
- Risk Analysis
- Case Histories
- Effects and Impacts
- Spill Movement
- Research and Development
- Training

805228

We propose to continue the previous years effort in the areas of:

1. Development of Improved apparatus for the control of industrial dust and fume with charged water fog.
2. Investigate the mechanisms of dust charging including the effects of heating, impurities, absorption of gases, i.e., SO_2 , etc.
3. Write a handbook on the Application of Charged Fog for the Control of Industrial Dust.
4. Continue to work with a variety of industries to demonstrate the application of charged fog to the control of dust, smoke, etc.
5. Expand the testing of the charged fog system for use on mixtures of fly ash and SO_2 . Here we plan to make use of on-campus facilities provided by industrial supporters and to go in-the-field for tests on small scale dust or fly ash/ SO_2 sources.
6. We expect to continue the development of dust controlled hand grinders and work with industry to bring them on the market.
7. Tests of the charged fog system for control of dust from moving sources, i.e., sweepers, front loaders, etc. are scheduled.

805229

(1) This research project is directed at the development of methods for the quantitative analysis and prediction of nutrient and toxic chemical fluxes to and from Great Lake sediments. The general problem contexts are (A) Nutrient regeneration and fluxes of ammonia, phosphorus, silica from aerobic and anaerobic sediments. (B) Toxic chemical fluxes and their adsorption/desorption from sediments. (C) Long term analysis of phosphorus fluxes to the sediments. (D) The sediment oxygen demand of central Lake Erie sediments.

(2) The calculation of depth distributions of chemical species within a sediment and their fluxes across the sediment-water interface is based on the solution of a mass balance equation for each species of interest. For the simple and unrealistic case of species independent transport the equations can be solved in a straightforward way. However the realistic case of species dependent transport requires numerical methods.

(3) Important progress has been made in the formulation and execution of sediment calculations as part of the Lake Erie dissolved oxygen analysis. The current calculation includes a one segment sediment model for each basin, representing the top 5 cm. Sediment interstitial water concentrations of ammonia and dissolved oxygen demanding material are computed dynamically and respond to the influx of settling algal and detrital carbon.

A basic requirement for any quantitative analysis of the effect of sediments on the behavior of toxic chemicals requires a rather detailed analysis of the adsorption/desorption mechanisms. A projected analysis of PCB distributions in Saginaw Bay provides a specific setting for an evaluation of this problem. A review of the literature on PCB adsorption/desorption for natural sediments indicates that the available data are sketchy and variable. Therefore in order to proceed with this component of the research it will be necessary to perform a series of experiments designed to obtain the necessary information using Saginaw Bay sediments.

- (1) Objectives. The objectives of the proposed research are to determine mechanisms and rate of sulfuric acid and sulfates formation from catalytic oxidation of sulfur dioxide, to investigate the effects of catalytic iron salts and organic compounds on conversion of sulfur dioxide in aqueous solutions and to assess the role of liquid phase oxidation in the formation of sulfates aerosols in ambient and polluted atmosphere.
- (2) Approach. Kinetic experiments will be carried out in liquid phase using stopped-flow technique. Mechanisms and rate of oxidation of sulfur dioxide by oxygen and ozone in aqueous solutions will be determined utilizing the kinetic data. Catalytic effects of iron salts and influences of organic compounds on the reactions will be investigated.
- (3) Current Plans. The proposed research will be divided into several subsystems to study the kinetics of oxidation with or without catalytic agents and organic compounds. The experiments will be conducted at temperatures ranging from 10 to 30°C in aqueous solutions with pH ranging from 2 to 11. Absorbances and, in turn, concentrations of the solutions during reactions will be measured and analyzed to determine the reaction kinetics.

805264

"Lake Sacajawea Rehabilitation"

- (a) To divert nutrient and sediment laden waters from the lake by dilution and displacement, and
- (b) to remove nutrients from within the lake by dredging organic rich sediment from its bottom

805284

"Finger Lakes Restoration Project"

- (a) To connect twelve small acidic lakes to form one long narrow lake, and
- (b) to construct five small dams, and
- (c) to remove two plugs of mine spoil.

805288

This project is to evaluate the use of tropho-dynamic analysis of food web relationships in the determination of the recovery of a polluted coastal system following the initiation of a pollution control program for the processing of bleached kraft mill effluent. This project is to develop methods of quantitative sampling and statistical analysis of field collections with an emphasis on the interrelationships of habitat recovery, trophic response of dominant population, and succession of coastal assemblages within a predetermined spatial and temporal context.

By using an extensive (existing) data base together with comprehensive statistical analysis of the distribution of benthic macrophytes, fishes, and invertebrates (infauna, epifauna) in formerly polluted and unpolluted (control) areas of Apalachee Bay (Fig. 1), the feasibility of utilizing tropho-dynamic responses of fishes will be studied to determine the mechanism of recovery in a shallow coastal system. Various hypotheses will be tested which associate habitat destruction to community structure, with an emphasis on testing the feasibility of relating feeding relationships to recovery of damaged aquatic systems. It is anticipated that such methods will then be applied to related problems concerning impact analysis and recovery problems in other coastal systems. Past studies have shown that the impact of organic pollutants such as kraft mill effluents cause serious disruptions in natural energy transfer mechanisms (Livingston, 1977). This study is designed to analyze such relationships so that recovery rates can be established in a comprehensive fashion. By applying statistical tests of significance to stomach content data in a spatially-oriented and time-related series of collections, this project will provide a basis of comparison for other such field projects in the future. Thus, the proposed project based on extensive studies carried out over the past 6 years in the area of study, will approach certain important questions concerning population and community trophic response while estimating the effectiveness of a pollution control program and the recovery potential of a shallow coastal system.



805295

"Prevention of Pollution in Municipal Water Supply Reservoir"

The objective of the project is to reduce sediment and nutrient loading to Vandalia Reservoir by constructing sediment catchment basins in the watershed and implementing best land management practice. The Reservoir will be dredged to restore the original volume of the impoundment and to remove an in-lake nutrient source.

805310

The City of Moberly, Missouri proposes the rehabilitation, upgrading and the mitigation of existing environmental degradation of Rothwell Lake, a 25 acre public access lake, located in Rothwell Park a 330 acre public recreation area on the west central edge of the city.

The lake, approximately 25 acres in size, is undergoing rapid eutrophication due largely to siltation combined with both point and non-point pollution. This process is resulting in the lowering of the lake's recreation potential by rapidly decreasing the water depth, poor oxygenation, excessive growth of aquatic plants and accompanying problems which affect the maintenance of a manageable fish population.

While a number of alternatives are possible to slow the eutrophication process and to provide for a manageable lake environment, the most beneficial long-term solution would be to dredge the mud and silt from the northern end of the lake bottom and deposit it in an acceptable holding basin.

805312

The objective of the proposed research is to develop, by means of a laboratory investigation, a less cumbersome and more accurate means of determining discharge over a 90° V-notch weir by taking direct measurements at the weir plate. Compliance monitoring in connection with NPDES permits requires a procedure that can be easily applied in the field with a minimum of tools or instrumentation. Weir head, the level pool head above the weir crest, is a difficult measurement to make since it must be made some distance upstream of the crest. Therefore, the main thrust of the investigation will be to select a new parameter that can be measured in the vicinity of the weir plate. The new parameter is to be related to discharge by defining an empirical relationship by means of calibration tests to be conducted over the discharge range of approximately 0 to 5 cubic feet per second. Drawdown of the water surface in the vicinity of the weir plate will require careful definition of the new measurement parameter.

The objective of this project is to construct a thorough description of the composition, distribution and correspondence to prominent environmental features (e.g., sediment texture, concentrations of toxic chemicals) of benthic animals in Lake Michigan. A set of 302 samples arrayed over the entire lake was collected by the Canada Centre for Inland Waters in 1975. These samples will be processed under the present contract and supplemented by an additional 252 samples concentrated in the nearshore areas (less than 60 m deep) of the main basin in July 1977. Data from both sets of samples will be analyzed particularly for information about indicator species, so that a benchmark for future comparisons and assessments of relative improvement or deterioration of the benthic environment will be available. Descriptions of other basic characteristics of the benthos, such as arrangements of species into assemblages, and geographical gradients in assemblages which are related to climate or circulation patterns in the lake will also be undertaken.

The proposed project is intended to monitor water quality parameters over a period of two years that will give detailed information concerning the present water quality status of Santa Rosa Sound, Escambia-Santa Rosa Counties, Florida. From bi-weekly field samples, water quality parameters will be measured against a background of physico-chemical data. These parameters include B.O.D., inorganic and organic carbon, algal cell counts and types, and bacterial numbers and sizes. The major types of phosphate and nitrogenous species will be determined and correlated with algal population composition and primary production rates (to be measured in situ by the ^{14}C technique). The effects of nitrogen-phosphorus enrichment on algal productivity will be determined by employing the primary productivity measurement technique on in situ cultures on a seasonal basis. In addition to the regular sampling regimen, diel studies will be conducted to delineate daily trends in water quality parameters. Pilot investigations will be conducted periodically to indicate areas needing further investigation. It is anticipated that the information obtained from the proposed study will aid in the establishment of recommendations for the improvement of water quality in Santa Rosa Sound.

805371

The objectives of this project will be to evaluate both the cost and performance of a carbon regeneration system utilizing fluid bed principles, the cost and capabilities of a semiautomatic system for carbon handling, and the adsorptive effectiveness of virgin carbon and regenerated carbon for removal of chlorinated organic substances from drinking water. It has recently been established that the combination of chlorine plus natural precursor substances results in the formation of suspected human carcinogens known as trihalomethanes (chloroform, bromoform, etc.) Granular activated carbon is recognized as being an effective means of removing both trihalomethanes and precursors, but little is known about the cost and removal performance under actual operating conditions.

The general approach will be to utilize one of the four carbon filters at the Treatment Plant as a test filter, to fill one-half of the filter with virgin carbon, the remaining half with once-regenerated carbon, and then to compare the rate of trihalomethane removal between the filters over a repeated number of regeneration cycles.

Construction of the facility is scheduled to begin in April, 1978 and to be completed in the fall of 1978. The carbon will then be regenerated on a near continuous basis over a two-year monitoring and evaluation period beginning in January, 1979. Investigative work is to be carried out by the water supply staff of the Manchester Water Works working in conjunction with the Water Supply Research Staff of EPA.

805374

The objective is to present a two-day conference entitled "Coal Cleaning: An Option for Increased Coal Utilization?", in Arlington, Virginia on May 24, 1977 and May 25, 1977. The conference will highlight the institutional, regulatory and economic problems associated with the use of coal cleaning technology.

The approach is for Battelle's Columbus Laboratories, working closely with EPA, to handle all pre-conference and post-conference administrative and programmatic activities for planning and holding the conference. A 100-page EPA report of the proceedings will be issued within two months after the conference.

Two recently developed algal bioassays for toxic chemicals in water will be compared with the standard Algal Assay procedure: Bottle Test. Test chemicals will include commonly used herbicides, pesticides and some heavy metals. The results from the three tests will be evaluated in terms of ease of performance, comparability of results, expense and the time required to carry out the procedures. The three test procedures are as follows:

1. The Algal Assay Procedure: Bottle Test; commonly used at present and recommended by the USEPA.
2. A test that uses the intensity of bacterial luminescence as an index of algal oxygen evolution and hence photosynthesis when these two organisms are mixed in the presence of test chemicals.
3. A procedure that employs a polarographic oxygen electrode to determine the rate of algal oxygen production as in #2.

The proposed work is the continuation of a study, previously funded by EPA contracts, to determine the effect of long term exposure to oxidant air pollutants on a western coniferous forest ecosystem and to develop predictive models for the system. Nineteen major plots were established along a 35 mile long transect with an oxidant pollutant gradient. Several other smaller satellite plots have also been established for special studies and one large plot is used to study tree mortality. A monitoring network is established to record climate and pollutant conditions. Other subprojects designed to evaluate pollutant effects include: tree growth, rating of visible pollutant injury on major tree species; population dynamics study with bark beetle; measure rate of accumulation and decomposition of litter; measure precipitation, soil moisture, and soil temperature; measure reproduction (cone and seed production) of major pine species known to be affected by the pollutants; evaluate the response of pathogenic organisms to air pollutants; determine rate of new seedling establishment and identify organisms responsible for damping-off; evaluate mortality of tree species and describe successional patterns. Data collected will be stored in an established data management system and will be used in the development and testing of predictive models.

805428

This research effort is to help evaluate the human health risk of prolonged exposures to mineral fibers. The project will employ four different research methodologies to obtain information on the carcinogenicity of mineral fibers as found in the Duluth, Minnesota water supply prior to mineral fiber removal.

Two major classes of investigation will be undertaken:

1. A retrospective epidemiological evaluation of the incidence of cancers from all sites occurring within the target population.
 - a. comparative analysis of age and sex
 - b. A case-by-case review of all cancers found within the population and evaluation of cancers by site relative to morbidity rates from the Third National Cancer Survey and the SEEK program of the N.C.I.

These comparisons will be analyzed with consideration given to the environmental monitoring data compiled from the fourth part of the project (Environmental Surveillance).

2. The second overall method of risk assessment will be an in-vitro study employing the so-called Ames screening method for determination of carcinogenicity followed up by use of mammalian cell cultures in an attempt to develop a dose-response relationship between the level of mineral fibers and degree of mutagenicity.

805441

An experimental design is proposed in which the behavioral and physiological reactions of scleractinian corals indigenous to hard bank communities in the Gulf of Mexico are determined in response to chronic low levels of drilling fluid components and shale oil products. The design incorporates time-lapse-macrophotographic and respirometric techniques to measure the response parameters. The corals shall be exposed to the contaminants in "flow through" aquaria on board a platform twelve miles offshore of Panama City. Controls shall include parallel observations of corals exposed to uncontaminated sea water in identical "flow through" aquaria, and of corals transplanted to the side of the platform at a depth similar to that from which they were collected.

805445

This three part study is intended to be the first phase of a long term effort to prepare guidelines to minimize the health effects from the land application of municipal wastewater and sludges and from other treatment processes. Population groups to be considered are those occupationally exposed to all aspects of the waste-handling operations, those exposed by way of their living, working or having recreational pursuits nearby and those who consume or otherwise come into contact with any crops or other products of the treatment system. The first part consists of an evaluation of current information on the health risks utilizing existing reviews and assessments as well as a supplemental literature search. This evaluation will also result in detailed plans for additional studies that are needed.

A pilot study of workers exposed to heat dried municipal sewage sludge that is ultimately applied to the land comprises the second part of the project. Included in the pilot study is a determination of the chemical and biological properties of the sludge and examination of the workers for possible effects of the sludge constituents.

The third part is a cause of death study of former employees of a large wastewater treatment system to determine if any causes of death occur more frequently than expected. The results of this mortality study will be used to help define the need for additional research.

The goals of the research are to demonstrate that sulfur-containing emissions from oil-fired and/or coal-fired stacks can be chemically specified and that their individual concentrations can be monitored by laser Raman scattering. Chemical speciation and concentration monitoring in real time of the sulfur dioxide emissions will advance the state of the art of pollution abatement. In particular, such measurements will further our knowledge of the effects of catalysts (such as vanadium), the total content in oil or coal, and boiler operating conditions (such as temperature and oxygen content) on the generation of these individual sulfur-containing emissions.

We will investigate the Raman shifts and linewidth of H_2SO_4 , SO_3 , and SO_2 in the gaseous phase and sulfates in the solid phase (particulates). The Raman shifts and linewidth will be used as unique signatures of the chemical compounds and their phases. We will also measure the absolute Raman cross sections of these gaseous and solid sulfur-containing molecules. The combination of the Raman shift, the linewidth, and the cross section will enable us to estimate the sensitivity (in terms of ppm or $\mu g/m^3$) and the number of different pollutants (in terms of chemical species and phase) which can be simultaneously monitored and distinguished in a stack emission when the laser Raman technique is applied.

The purpose of this investigation will be to determine under what conditions the hydrocarbon liquid-liquid extraction method (LLE) may be conveniently and accurately used to determine the concentrations of nine selected volatile organic halides (VOX) in dilute aqueous solutions which typify U.S. drinking waters. The nine VOX compounds are: chloroform, bromodichloromethane, chlorodibromomethane, bromoform, carbon tetrachloride, 1,2-dichloroethane, trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane.

The following parameters will be varied so as to optimize the LLE method:

- (1) nature of the hydrocarbon extraction solvent (n-pentane, n-hexadecane, and methylcyclohexane will be evaluated);
- (2) effect of various sample and solvent volumes at three different solute concentrations (see below for details);
- (3) effect of added salt (e.g. sodium chloride) and pH on the extraction process;
- (4) effect of added methyl alcohol;
- (5) effect of added internal standard for GC analysis.

The optimized LLE method will be compared with the purge/trap method of Bellar and Lichtenberg (JAWWA 66 (1974) 738) and other VOA methods which appear promising.

805487

The present drinking water standard for selenium is 10 ug/L (10 ppb). This value is purposefully set at a very low level since it was suggested that selenium may be carcinogenic. The value is restrictive, yet selenium is nutritionally essential to animals and humans. In addition, regionally high seleniferous soils yield foodstuffs containing high selenium in the diet. Recent studies in our laboratory have shown that 0.1 and 1.0 ppm selenium as sodium selenite in drinking water produced an adequate selenium status in rats. Experiments are proposed to determine the effects of various levels of selenium as selenite in water in combination with various levels of selenium present in food (selenomethionine, Se-methylselenocysteine, selenocystathionine, and selenite) on selenium adequacy and/or toxicity. These different forms of selenium available in foodstuffs will be compared with respect to potency, toxicity, and their occurrence in the environment. In addition, studies will be conducted to determine whether selenium has an effect on protein synthesis, either to protect the liver from toxicity or to potentiate a toxic phenomenon; and on the metabolism of selenium, to determine its role in detoxification or enhancement of toxicity.

805493

"Electrochemical Coagulation Study for Fish Processing Wastewater"

A mobile pilot plant consisting of electrochemical coagulation/flotation followed by sand filtration will be designed, constructed and operated at several seafood processing plants to determine the technical and economic feasibility of the processes. The sludge will be evaluated for possible utilization.

805494

The objective of these studies is to provide a firmer understanding of the behavior of porous polymer sorbents in source sampling efforts. Previous work has dealt with the effects of reaction with acids and acid gases on the sorption capacity and selectivity of these materials. Results to date indicate that sulfonation and nitration can indeed effect both the amount and the relative distribution of representative organic compounds on these sorbents. This effect will be especially significant if the sampling effort is carried out past "breakthrough;" that is, if the sorbent trap capacity is exceeded by the challenge concentration. Porous polymer sorbents have been used to sample ambient air and sources at temperatures in which the principle sorption mechanism is gas-solid adsorption. More recently, these sorbents have been used in source sampling at temperatures which cause the condensation of significant amounts of water. This reduces the probability of acid-polymer reaction but also changes the nature of the sorption process to a liquid-solid mechanism. In the work proposed both dynamic (liquid chromatography) and static methods will be examined as methods for the laboratory measurement of sorption capacity and selectivity as a function of pH and temperature. In addition, the relation between water-benzene distribution and water-styrene polymer (XAD-2) adsorption will be examined. Information obtained from literature values for benzene-water-solute systems and laboratory-measured polymer studies will be used to attempt to develop a predictive model for sampling purposes.

805504

"Lake McQueeney Restoration Project"

The project consists of the removal of decayed organic matter and silt by the dredging or excavation of an area of Lake McQueeney to a minimum depth of 5 feet. Removal of approximately 100,000 cubic yards of material will be necessary.

805510

Lake Vancouver is a eutrophic urban lake in Clark County, Washington which is presently undergoing restoration. The objectives of this restoration are the control of non-point pollution improvements in its aesthetic qualities and the provision of recreational benefits. The social implications of restoring Lake Vancouver have not been determined. The objective of this research is to wholistically examine the range and type of social impacts that may be generated by or associated with the restoration process. In addition, the research effort will test and refine a research model previously designed by the principle investigators for the Environmental Protection Agency. The research approach is adapted from this model and employs participant observation as well as social survey as methods of data collection. An integral portion of the research design is a cultural-ecological framework which illustrates the ability of human populations to adapt to the presence of resource developments.

KEY WORDS: Social Impacts/Implications
Participant Observation
Cultural-Ecological
Adaptation

805551

Statement of Major Objectives: Phase I: Establish the sites & types of cancer for which the rates differ between predominantly industrial & predominantly residential parts of Contra Costa County. Phase II: Establish the relationship, if any, between site & type of cancer as related to occupation from mortality & morbidity data for the years 1974 thru 1976 in the heavily industrialized & the residential parts of the county. Phase III: Provide supportive evidence of the relationship between the incidence of selected cancer sites vs. designed variables & controls, thru the comprehensive interviewing of a case population of 1000 patients. Phase IV: Final conclusion & write-up of the study. Major Activities towards achievement of Objectives: Phase I: Collection of 1969-74 data of cancer incidence from the Calif. Tumor Registry (CTR) for Contra Costa Co.; collection of data & results of interviews of the 3rd Nat'l Cancer Survey for Contra Costa Co.; analysis & processing of data correlating it to county census tract, age, sex, race & other demographic census parameters as related to cancer site & type; write-up of Phase I report. Phase II: Collection & analysis of hospital records & death certificates for cancer cases for the years 1974-76; correlating cancer type & site with occupation & other variables. Analyze & process the data available to correlate site & type of cancer against census tract, occupation, birth place & other variables; write up a field report clarifying the findings & conclusions of this phase of activity. Phase III: The field workers will interview 1000 cases with specific selected sites based on findings of previous phase; the comprehensive questionnaire will be addressed to cases diagnosed during the years 1975-76; the data collected will be processed & related to the variables available in the questionnaire form; air pollution emission patterns will be analyzed; a final report will be submitted at the end of this phase achieving the objectives stated earlier. Phase IV: The Project Director in coordination with the project staff, the Technical Advisory Comm. & other consulting agencies or individuals, will prepare the final & comprehensive write-up of the study; submit same to all concerned agencies; prepare summaries of the study for distribution and publication.

805565

The main objective of the proposed research is to determine the utility of wet oxidation in the destruction of certain hazardous chemicals and to develop engineering data which will facilitate the estimation of costs of wet oxidation for the treatment of industrial organic wastes. This will be accomplished through a study of the effects of operating variables (temperature, oxygen pressure, agitation intensity, catalysts, pH, retention time) on the wet oxidation of typical hazardous chemicals using both a conventional batch autoclave and a continuous flow multi-stage autoclave. Major emphasis will be placed on the identification of intermediate and final reaction products.

Practical applicability will be assessed by subjecting samples of actual industrial wastes to wet oxidation. Finally, information gathered in this study will be used to prepare process flow sheets and cost estimates for a commercial unit to treat an industrial waste stream.

805568

"Blue Lake Restoration Project"

- (a) To dredge the northern portion of Blue Lake, and
- (b) to conduct a water quality investigation, and
- (c) to provide supplementary water source and supply.

805569

1. Objectives: The Ohio River Basin Energy Study (ORBES) was initiated to assess changes that may occur in the various sectors of society, industry, and environment as a result of future increases in number of energy conversion facilities. During the second year of this study each participating research group will address itself to one of the areas thought to be affected. The group from the University of Louisville will address aspects of water quality, water quantity, and special aquatic habitats.
2. Approach: The assessments will be made by compilation and analysis of existing data possibly supported by Special Studies of specific areas where existing data is weak or lacking.
3. Current Plans and/or Progress: Participants from nine midwestern universities divided into three assessment teams have submitted independent preliminary first cut assessments of the changes which may occur as a result of these developments. These assessments will be condensed into one major document which is to be submitted to Congress in December 1979.

1. Objective: To develop practical pest management procedures for U.S. greenhouses utilizing Encarsia formosa, Phytoseiulus persimilis, selective pesticides and/or application techniques for insect and mite control, combined with composted hardwood bark for control of soil borne diseases.
2. Approach: Initially, this project will involve greenhouse tomatoes, cucumbers, and poinsettias. Other crops will be added as information is developed. Trials will be conducted in research as well as commercial greenhouses, as appropriate to crop - pest combination.
3. Current Plans:
 - A. Develop parasite and predator rearing and distribution techniques.
 - B. Conduct demonstration trials in commercial greenhouses throughout Ohio for insect, mite, and disease suppression.
 - C. Gather data for registration of selective pesticides and/or application methods through the IR-4 program.
 - D. Determine the anti-fungal spectrum of a natural fungicide in composted hardwood bark.

805576

The objectives are:

1. Conduct of a comparative survey of organic residues of drinking water using both bacterial and tissue culture systems for in vitro detection of active mutagens and carcinogens.
2. To study the metabolic effect of mutagens/carcinogens upon the detector systems.
3. Test organics from drinking water for presence of promutagens.
4. Develop an intestinal epithelial cell system responsive to chemical carcinogens.
5. Fractionation of organics from drinking water by standard means according to their properties of bacterial toxicity and mutagenesis.

The Salmonella/microsome system will be used with TA98 and TA100 being applied in initial surveys, followed by other of the major and ancillary testers. Clone 3T3-113 of mouse embryo fibroblast will be studied for transformation and for mutation. A mouse intestinal epithelial cell system will be developed using culture conditions to favor the desired cell type. Liver microsomes will be prepared from animals induced by conventional and experimental compounds.

Both with and without added microsomal activation, the mechanisms of mutagenesis and carcinogenesis will be examined in terms of cell metabolism. Bacterial testers will be studied relative to the growth phase of the inoculum. Mammalian cell studies will include co-carcinogen and cyclic nucleotide effects, and a monitoring for viral induction during chemically induced transformation. Fractionation of chemicals from drinking water will be by methods based upon solubility parameters, and by high pressure liquid chromatography techniques, according to the activity of fractions in the Salmonella/microsome system.

805581

In 1974 the Environmental Protection Agency (EPA) began a long-term study of air pollution effects on the grassland ecosystem near coal-fired power plants at Colstrip, Montana. This study is broad in scope but one particular aspect, of concern here, has been on the potential of birds as bioindicators of pollution. In the three year period, 1974-76, many avian specimens were collected in the Colstrip area by EPA personnel and large quantities of data were gathered on seasonal cycles in body composition, organ system function, and bioenergetics. Since the power plants did not become functional until 1975 and 1976, these data have the potential of providing a solid base of information that can be used to quantify pollution effects which may accrue in the future. At this time, however, many of the collected bird specimens have not undergone laboratory processing nor has existing data been pulled together in useful form. It is the purpose of the study proposed herein to complete the necessary laboratory procedures on stored specimens, make additional collections, if necessary, to fill informational gaps, compile and evaluate all pertinent data, and construct a final report of sufficient scope and detail that will constitute an effective documentation of biological function in grassland birds of the Colstrip area.

805583

1. Objectives: To determine the thermal preference of each of three stocks of Largemouthed bass (*Micropterus salmoides*). Stocks are identified as: Northern - Minn. & Wis. fish, Midstates - Tenn. fish, and Southern - Louisiana fish.
2. Young of the year bass will be obtained from the identified areas and conditioned to test tanks for a one week period prior to a trail run. Fish will be placed in temperature preference apparatus (a series of shuttle boxes in which a fish controls its own environmental temperature by choosing a side of the divided experimental tank. Divider has photo-electric cells which monitor the passing of the fish and turn off or on tank heaters to increase or decrease the tank temperature.) Two replicates will be run on each stock.
3. Temperature preference for each stock will be determined and data tested to see if significant differences exist between stocks.

805585

This proposal is part of a series of institutional grants which comprise the Ohio River Basin Energy Study, Phase II, Year II. The broad objectives of this study are to engage in a comprehensive policy oriented technology assessment that addresses the environmental, public health, economic, institutional, and social effects of locating various combinations of energy conversion and related support facilities in the Ohio River Region.

Phase II of this study is being carried out by an interdisciplinary group of researchers from various universities. This application sets forth the participation of researchers from West Virginia University representing the disciplines of law and economics.

805587

"Ohio River Basin Energy Study, Phase II: Illinois Core Team Participation"

This study is part of a technology assessment of the social, economic and environmental consequences to be expected from an increased concentration of energy facilities within the Ohio River Basin.

805588

1. Objectives. The Experimental Management Plan for the Ohio River Basin Energy Study (ORBES), Phase II: An Impact Assessment of the effect of Energy Conversion Facilities on the Ohio River Basin is a continuation of the management of a comprehensive, policy-oriented technology assessment addressing the broad-scale environmental, public health, economic, institutional, and social effects of locating various combinations of energy conversion and support facilities in the Ohio River Basin.

2. Approach. The integrated technology assessment is being conducted by an inter-disciplinary, interinstitutional (eight state universities in the six study-region states of Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia) team, with support research performed by other personnel on a schedule to best fit the research needs of the technology assessment team. The management of this research will involve a complex arrangement to best coordinate efforts and further the achievement of research goals. A four-person Project Office will perform day-to-day coordination, while a seven-person Management Team consisting of the Experimental Management Plan co-principal investigators and five U.S. Environmental Protection Agency representatives will provide long-term and policy guidance.

805589

This project is the second phase of a technology assessment of energy development in the Ohio River Basin. A core team composed of members from nine different university campuses in six states will direct and delineate research activities in this phase of the program. First, reports from Phase I of the project will be reviewed and key issues for further research identified. The baseline data for the study will be refined and a new set of energy facility siting criteria developed. The core team will then review basic technological, sociological, and demographic assumptions and create a set of energy development scenarios relative to coal mining, transportation, and conversion facilities, and to other types of energy facilities in the study region.

Given these scenarios the impacts of the energy facilities on the physical environment, socio-economic conditions, ecological factors, public health, institutions, land use, and the quality of life will be assessed. The Phase II impact analysis will emphasize the tracing of second and higher-order impacts and the interrelationships among them. Based upon the impact assessment, a range of possible options under each scenario will be determined.

The primary roles of Dr. Gordon will be to assist in the analysis of social and economic impacts of alternative policies, to continue to lead the overall impact assessment, and to help to integrate the impact analysis into a comprehensive report.

The objective of the ORBES project is to conduct an Integrated Technology Assessment of energy conversion facilities in the Ohio River Basin Region. The past year has seen over one hundred researchers at eight campuses in the Region collecting and analyzing baseline data in relevant areas in order to conduct a first-cut or "mini"-assessment. The second year of the project (Phase II) is to be devoted to identifying, requesting and supervising research in areas deemed inadequately covered in the first year. The project has been reconstructed so that there is a Core Team of thirteen researchers from ten institutions (the ORBES region) has been expanded to include West Virginia and Western Pennsylvania in addition to last year's Ohio, Indiana, Illinois and Kentucky areas) who will perform the Integrated Technology Assessment. The Core Team represents a variety of relevant disciplines capable of taking on the assessment task.

The University of Kentucky's two Core Team members represent the disciplines of sociology and economic geography. In addition, the anthropologist is helping conduct the social impact assessment of increased power production in the ORBES area. Contributions to be expected include a study of the impact of service areas on electric power generation and transmission and further refinement of the social impact assessment analysis. The latter study includes an operationalization of an environmental orientation paradigm, preparation of demographic profiles of counties by environmental orientation and an impact assessment. This work will be used cooperatively and integratively by the Core Team to perform the Technology Assessment.

Under P.L. 92-500, EPA is embarking on a major program of cost-sharing grants to implement lake rehabilitation or water quality improvement projects. While limnological evaluation has developed and will be used in conjunction with these projects, improvement (maintenance) of water quality impacts the lives of people and organizations as well as the eutrophic condition of the lake itself. However, the methodology to measure the impact of water quality improvement (protection) projects on the socioeconomic well-being of people and on the viability of organizations and communities in the region is rudimentary in general and virtually nonexistent with respect to this new financial assistance program. Such methodology and measures are needed not only to fulfill the requirements for the federal and state environmental impact statements but also to help select lake communities as recipients of state and federal grants and to evaluate the effectiveness of various project techniques.

805600

The Franklin Institute Research Laboratories, Science Information Services Department, proposes to provide key technical and administrative personnel, both government and non-government, with a current-awareness bulletin emphasizing advancements in the field of industrial waste treatment as related to pollution control. A monthly publication containing approximately 25 abstracts of articles and additional annotated citations pertinent to industrial technology will be prepared for and distributed to these recipients. In addition, abstracts related to water resources will be input to the Water Resources Scientific Information Center (WRSIC) to become part of their machine-retrievable data base. The full text of the abstracted documents will also be provided to WRSIC. Annual subject and author indexes, a journal list, and a compilation of each of the monthly bulletins will be included as the camera-ready copy of the Final Report.

805603

The overall purposes of the Ohio River Basin Energy Study (ORBES) are (1) to identify and evaluate the potential consequences of various levels, rates, and patterns of future energy development in the Ohio River Basin, (2) to formulate policy alternatives that could mitigate the undesirable consequences or reinforce the desirable consequences, and (3) to summarize this information and present the results in a usable final report and in public meetings throughout the ORBES region.

Thus ORBES is an interdisciplinary, policy-oriented technology assessment that seeks to inform the public, industry, and all levels of government about the probable environmental, public health, economic, institutional, and social consequences of locating various combinations of new energy conversion and related support facilities in the Ohio River region.

Liberty Lake is located in the middle eastern section of Spokane County approximately 24 km directly east of the city of Spokane. The lake occupies a basin of 316 ha in a watershed of approximately 3445 ha. The watershed is relatively undisturbed but the immediate area around the lake has been extensively manipulated since 1880. The shoreline is now 83% developed and the lake receives heavy recreation useage. Since the 1960's massive blue-green algal blooms have occurred in the lake during late summer and fall with the exception of 1974-76 when an aluminum sulfate treatment was credited with reducing excessive algal growth.

In 1976 the lake residents and their consultants successfully proposed a lake restoration plan to the U.S. Environmental Protection Agency. The plan includes lake draw down, limited dredging, stream channel and dike improvements and repair. The proposed study will attempt to measure the effects of lake restoration by observing selected biological, chemical, and physical parameters for one year prior to restoration and for two years following rehabilitation.

Specific research objectives for purposes of evaluating the effectiveness of restoration measures include:

1. Monitoring of 25 chemical and physical water quality parameters.
2. Recalculation of prime nutrient (N & P) budgets.
3. Attempt to quantify nutrient contribution by septic tank seepage.
4. Determination of sediment nutrient content above and below proposed dredging activities.
5. Estimation of primary productivity and algal speciation before and after restoration.
6. Monitoring of aquatic weed growth.

The objectives of this proposal is to develop an information and data base for the detailed consideration of potential impacts of future energy requirements and conversion activities in the Ohio River Basin. Phase I includes: demography, energy use by source and by sector; electricity exported and imported; energy reserves, electrical generation capability by facility and fuel type; plant ownership; and social and economic data on region residents. In Phase II the baseline data will be completed by additional information on migration, land use projections, induced industry, public health, water and air quality, coal mining, social services, recreational facilities and economics.

The approach will include: 1. collection of available baseline data; 2. Extensive literature search; 3. Data and information analysis; 4. Participation in Core Team and public meetings. The results will be compiled into a complete and comprehensive documents.

Current plans include collection and evaluation of baseline data identical to those already obtained for Illinois, Indiana, Kentucky and Ohio and parallel those to be obtained by all states involved. This includes also participation on Development of Phase II Work Plan, Energy Conversion Configurations, Impact assessment and Definition of Policy Options.

805609

This set of studies represents a portion of a multi-institutional policy-oriented technology assessment of the socioeconomic and environmental impacts which might result from a proposed increased concentration of energy conversion facilities within the Ohio River Basin.

Utilizing the best available data bases, these studies will attempt to address the broad-scale environmental, institutional, economic and social effects of various future combinations of energy conversion facilities (i.e., coal-based plants producing synthetic fuels, as well as nuclear and coal-fired electric power generating plants) and their required support facilities (i.e., coal mining, processing and transportation; ash and sludge disposal facilities; nuclear fuel and reactor waste transportation facilities; and energy transportation systems, including electric power transmission systems) that might be built and operated in this region in the future.

The principal objectives of this assessment are (1) to assist in outlining the full range of policy options for dealing with selected kinds of development, alternative levels of development and their possible undesirable effects, and alternative technological levels of environmental controls; and (2) to analyze the probable impacts that would result from implementing each option in its total framework, with special emphasis on the natural environment and its inter-relationship with public health and welfare. The full range of primary, secondary, and higher order effects will be considered.

805610

One series of objectives is to carry out studies to ascertain if, how, and when the gaseous and particulate emissions of coal-fired power plants accumulate in and on domestic and indigenous species of flora and fauna and cause an impact upon these species. Another series of objectives is to carry out studies on indigenous species of a cool season, short-grass ecosystem fumigated continuously with various concentrations of sulfur dioxide for five months per year to ascertain changes in sulfur accumulation, phenology of grass species, mycorrhizal populations, and fungal and insect decomposer populations.

805612

A prior study by the investigators comparing 300 high school sophomores in a high sodium (108 ppm) with those in a low sodium (8 ppm) drinking water community indicated a medically and statistically significant upshift in the population blood pressure (B.P.) distribution in both males and females for both systolic and diastolic B.P.'s. A subsequent analysis of home first morning tap water samples for nine heavy metals potentially related to circulatory system disease is currently underway along with an analysis of the circulatory system mortality experience of the two communities over the past decade.

The phased research program being proposed for this grant is designed to provide further human population data on the health effects of sodium in the drinking water. The specific studies are: a replication of the original study in a second grade population; replication in two different watched communities with only half the difference in sodium levels; a bottled water study to differentiate the sodium effect on B.P. distributions from other water factors; a before and after community change-over to low sodium water study of B.P. distributions of sixth graders and early middle-aged adults; a before and after study of hospitalized incidence of circulatory system morbidity.

805617

Phase 1 of the subject proposal is devoted to conducting a detailed study of the demand for water and to developing a data base for the estimation of individual residential water demand curves. A statistically selected sample of houses will be visited by interviewers to obtain information concerning water using devices within the home. Corresponding water demand data will be obtained from the water utility and county tax rolls will be used to estimate the economic status of the household visited. Regression techniques will be applied to these data to establish demand equations.

Phase 2 will study the efficiency of water system consolidation. The study will be conceptual in nature and will apply some of the insights that have been obtained from research into the feasibility and effectiveness of consolidation and regionalization of electrical systems. Some of the sources of economies of large power systems are (a) traditional economies of scale and generation given in particular technology and input prices; (b) economies of scale and distribution; and (c) economies of size. The applicability of these principles to water supply systems will be examined.

805628

The research to be conducted under this grant will examine the potential use of microprocessor-based data-acquisition and experimental control stations for conducting biobehavioral studies in diverse field environments. Specifically, we shall expand on one such system we have developed for the conduct of studies of human event related potentials. This small (30 lb.) system called PEARL is a self-contained computer driven psychophysiological laboratory. It has a limited capacity for the bulk storage data and for the data reduction required by ERP. Thru the use of a novel architecture and the development of economical data reduction techniques, we shall develop and test a new version of PEARL.

805629

Objective: The general objectives are to collect information needed to develop methods for preventing or minimizing adverse effects on soils, crops, water, and animals, and maximizing benefits from using sewage sludge as a fertilizer and soil conditioner.

Approach: Field plots and lysimeter plots with three soil types and strip-mined soil will receive liquid digested sludge applications at varying rates (0, 1/4, 1/2 and maximum). Some plots have received annual sludge applications for nine (9) years. Maximum rate is equivalent to one inch per week for about six to nine weeks. The effect of sludge components on soil, water, and crops will be determined by regular sampling and analysis. Corn and soybeans produced on sludge treated soils will be fed to laying hens. The effect on the health, composition and production of the hens will be measured over a period of 80 weeks. Cadmium accumulation in the hens and eggs will be determined. A single application of dewatered sludge at high rate on field plots on strip-mined soils will be compared to incremental liquid sludge applications annually.

805635

The Garbage Project has been conducting research on household-level discards since 1973 and to date has analyzed more than 2000 garbage samples. The purpose of the Project's research is to relate consumption and discard patterns, as represented in household residuals, to socioeconomic variables. In 1977-78 the Project will focus upon the discard of newspapers and soft drink containers in an effort to monitor any changes in the frequency or volume of these discards during a time period in which the City of Tucson will be conducting mass media campaigns designed to encourage source separation of newspapers and source reduction of soft drink containers. The results of this monitoring process should yield information about the feasibility of using media campaigns to promote reduction of residential solid wastes. In addition, the Project will continue its longitudinal sample of both food and non-food discards and a study of hazardous wastes in the residential solid waste stream will be conducted.

805640

This proposal consists of 3 parts; all are aimed at air-quality modeling dealing with urban problems and are to be verified with observations of T-6 St. Louis experiment (RAPS). In Part I, a simple vertical 2-dimensional atmosphere model will be applied and tested using various formulations of heat flux and mixing coefficients in the boundary layer. Part II will concentrate on the development of the proper lower boundary conditions in urban situations, particularly St. Louis and Los Angeles. A new method will be tested for deriving the correct ground parameters necessary to yield the proper surface energy balance using satellite infrared measurements for these two cities. Surface heat fluxes will be computed and compared with independent estimates. In Part III, the observed distribution of NO_x and perhaps CO will be used to test an air-quality model developed for Los Angeles, making use of observed temperatures, mixing depths and heat fluxes as well as estimates of these quantities by a quasi-2D horizontal by dynamic model.

805650

The interaction of the control device and resulting in-stack plume opacity will be systematically analyzed. Computer models for electrostatic precipitators, baghouses, and scrubbers will be coupled with Mie light scattering programs to allow the desired calculations of in-stack plume opacity. Existing field data will be analyzed and used to compare to the model. Additional particle properties such as refractive index density and porosity will need to be determined from samples of particulate matter in order to provide accurate inputs to the model.

The expected results of this study will be the ability to design control devices to meet an opacity limit and select the optimum control device for coal-fired utility boilers.

The objective of this testing program is to measure the environmental impact potential of the ocean disposal of treated FGD materials.

I. Chemical Testing. Because of the possibility that treated FGD materials may be used in the construction of artificial reefs, it is necessary to expose 4 or 5 different materials (with a control material) to variations in such basic parameters as temperature, salinity and pressure (depth). It is also important to vary the oxygen content of the surrounding environment. The testing will focus on quantification of the leaching characteristics of the different materials, specifically with regard to major constituents of concern (e.g., sulfite) and the following trace contaminants: mercury, cadmium, selenium, zinc, nickel and lead.

II. Long-Term Exposure Study. These tests will study the ecological impacts of the long-term exposure of representative marine organisms to a subset (probably three) of the treated FGD materials previously subjected to the chemical testing described above. These tests will be designed to satisfy chronic bioassay requirements of the ocean disposal test program, and in all probability will also satisfy the acute testing requirements because of the nature of the material involved. In addition, these tests will provide a mechanism for studying the structural integrity of the brick-like treated materials under simulated disposal (or reef) area conditions. As in tests of

untreated material, water column levels of sulfite and dissolved oxygen will be monitored, along with selected metallic trace contaminants. The test organisms will be representative of three trophic levels of the marine food web, including vascular plants, primary consumers and secondary consumers. Uptake of the trace contaminants of concern will be monitored in these test organisms. It will be important to select species for this test based upon the tendencies to colonize artificial reef substrates; lobsters, crabs and starfish would be suitable.

III. Disposal or Reef Site Simulation. Based in part upon the results of the two program elements described above, a controlled marine system will be structured in order to observe simulated disposal site ecosystem dynamics. An example of such a system is the pond to be used by the New England Aquarium for the implementation of a similar test program for a selected, untreated FGD sludge. As in that work, the emphasis in this effort will be to establish an extensive qualitative history of the ecological implications of the simulated reef building or disposal effort. This effort will provide an opportunity for the observation of a relatively natural pattern of reef colonization and utilization; and in turn, a valuable source of information concerning the viability of treated, brick-like FGD materials as reef substrate.

805659

A general three-dimensional mesoscale model has been developed which is applicable for a wide variety of purposes. Emphasis during the next three years will be on developing more efficient initialization techniques and on verifying the model. The verification will include real data cases on the regional scale utilizing regular and special meteorological data and on small scale situations utilizing intermodel comparisons and comparisons with climatological data representative of small-scale circulations. If possible, some of the real data cases will be selected to coincide with field experiments relevant to air pollution studies.

805660

"Alaska Village Research Project"

To provide for technical assistance and operations and maintenance support to this small community for the operation of a central-utility type facility (including water supply and waste treatment systems) for EPA's evaluation of engineering performance and institutional management.

805661

"Alaska Village Research Project"

To provide technical assistance and operation and maintenance support to this small community for the operations of a central utility type facility (including water and waste treatment systems) for EPA's evaluation of engineering performance and institutional management.

805672

"Evaluation of Lafayette Reservoir Restoration Program"

This project involves a limnological evaluation of the effectiveness of hypolimnetic aeration and nutrient inactivation with particular attention to the improvement of water quality in the reservoir for public water supply use and for maintenance of a year-round rainbow trout fishery.

805675

- (1) OBJECTIVES: To hold the FIFTH national Conference on Energy and the Environment at Stouffers Cincinnati Inn, Cincinnati, Ohio on October 31, November 1, 2, and 3, 1977
- (2) APPROACH: Through technical societies in the greater Dayton and Cincinnati areas plan and execute an aggressive work plan which will generate maximum interest in current topics and technical opportunities in utilizing energy in an environmentally acceptable manner. Technical papers and discussions by leaders in industry and government will be invited to participate.
- (3) PROGRESS: Over ninety technical papers have been accepted for presentation at the conference. Four workshops and two evening sessions have been formulated, A PUBLIC INTEREST FORUM and a REGIONAL ENERGY DEVELOPMENT FORUM which will include public participation. A bound volume, PROCEEDINGS of the FIFTH National Conference on Energy and the Environment is expected to be published shortly after the conference.

805678

Rates of dissolved oxygen uptake by respiration, benthic demand and BOD, oxygen production by photosynthesis and surface reaeration rates as a function of wind will be measured and correlated with controlling parameters. The results will be incorporated in a D.O. routing model, the purpose of which is to determine whether a diel curve of D.O. can be used to give an accurate indication of primary planktonic productivity in a set of field channels which are used to study effects of toxicants on ecosystems. A second objective is to relate reaeration rates measured in the channels to wind velocities and channel flow characteristics. A third and minor objective is to explore a new stream-modeling concept. Experimental work will be combined with analytical (numerical) modeling.

Dr. Heinz Stefan, Professor
St. Anthony Falls Hydraulic Laboratory
Department of Civil and Mineral Engineering

(Principal Investigator)

John S. Gulliver, B.S. Chemical Engineering, M.S. Civil Engineering, Research Assistant

Dr. Walter Combs, Jr., Research Fellow

805680

This project will delineate the conditions under which bacterial regrowth and coliform suppression occur in water distribution systems.

This project will examine two distribution systems which have ongoing problems with high standard plate counts or high noncoliform counts on membrane filters. One system will be of ground water origin with chlorination as the only water treatment and the other will be from a treated surface water source. Both systems will receive raw water that is of good quality.

The systems will be monitored as the finished water leaves the plant and at various locations in the distribution system including any specific problem areas. The identified systems will be characterized physically and chemically. Parameters within the distribution system as temperature, turbidity, color, dissolved oxygen, pH, residual chlorine, trace elements, and organic content will be monitored. Simultaneously, standard plate counts will be performed throughout the distribution system. The total number of bacteria appearing on the standard plate count will be identified at least four times during the first year of the project. Physical, chemical, and microbiological factors affecting the occurrence of bacterial regrowth will be identified. Coliform suppression will be evaluated in terms of microbial population densities, types of bacterial genera present, and possible chemical and physical factors. Alterations in the distribution systems to eliminate bacterial regrowth will be evaluated through field trials.

805681

"Detailed Evaluation of Long Lake"

This project is to determine the degree of water quality improvement in Long Lake, Minnesota resulting from various manipulations in the watershed.

805706

Support for conducting the Secretariat of the International Standards Organization (ISO) Technical Committee (TC) 147 on Water Quality which is developing international standards. The TC 147 Scope is "Standardization in the field of water quality, including definition of terms, sampling of waters, measurement and reporting of water characteristics. Limits of acceptability for water quality are excluded." Activities include standardization in chemical, physical, radiological, microbiological, biological and biochemical methods. Forty-five countries are members of ISO/TC 147 which was organized in 1972. Fourteen drafts of proposed standards have been developed and 42 working groups which are preparing drafts of international standards have been established.

805711

The objective of this study is to investigate the hematologic and mutagenic effects of arsine gas. Hematological investigations will be performed on rats, mice and rabbits inhaling various levels of arsine gas. Dose-response data and no effect levels will be obtained. Specific areas to be investigated are:

1. Arsine levels which induce hemolysis
2. Effect on acetylcholinesterase activity
3. Glycerol lysis time
4. Native protein fluorescence
5. Intracellular sulfhydryl levels
6. Na-K ATPase activity
7. Alteration of membrane proteins as determined by SDS polyacrylamide gel electrophoresis.

Mutagenesis studies will be performed on E.coli strain WWP₂. The goal of these studies will be to evaluate the possibility that arsine interferes with DNA repair mechanism. Also to be investigated are arsine gas effects on growth rate, and survival of bacteria after UV exposure (using exrA mutant). A dose curve will be obtained for any arsine effects observed in each of the studies listed above.

805715

"The International Commission on Radiological Protection Conference"

The International Commission on Radiological Protection is comprised of experts from all over the world. Through the vast knowledge of its membership, the commission periodically publishes recommendations for national radiation protection, laws, and codes of practice.

805716

The general purpose of the proposed work is to understand more thoroughly the fate of contaminants in large lakes, especially during stratification. More specifically, we propose to study in detail the fate of nutrients and trace metals as affected by dispersion in the lake and by biochemical transformations in the sediments. The main emphasis is on mathematical modeling and laboratory experiments, but field measurements will also be made for additional information and verification. The study involves analyses of physical, chemical, and biological processes and is meant to analyze not only these processes but the interactions between these processes.

805721

"Chemical Amplifiers as Odd Hydrogen Radical Detectors"

This proposal is for the continued study of HO_x radicals in smog chambers and in the atmosphere. HO_x molecules will be reacted with NO and CO and will be regenerated after reaction. Amplification factors of 10^3 are expected with the use of chemical amplifiers.

The objective of the proposed project is to plan, organize, publicize, and conduct a series of annual symposia on the transfer and utilization of technology for the control of particulate emissions. The symposia will be conducted late in July of each year at appropriate locations subject to approval by the Project Officer of the Industrial Environmental Research Laboratory at Research Triangle Park of EPA. The three major technologies used for controlling particulate emissions scrubbers, electrostatic precipitators, and fabric filters would be discussed. Other technologies would be included as they become more fully developed. As part of the total effort, proper documentation would be provided in the form of written periodic reports, a final report and, most important of all, publication and distribution of the proceedings. A corollary objective is to conduct a series of tutorial sessions and/or workshops in the design of electrostatic precipitators, fabric filters, and scrubbers, with special attention to theory, modeling and instrumentation.

This is a continuation of Grant R805725-01, which provided funding for the first symposium held in Denver, Colorado during 24-28 July 1978.

Smog chamber data from the Bureau of Mines have been somewhat successfully modeled by Dodge of EPA. This model was then further used to test the effects of diurnal light, dilution, initial percentage NO_2 , and the relative reactivity of the hydrocarbon mix on ozone production. However, it is not clearly understood how to represent day old materials in the model. Since there is a growing need to know how much influence spent smog systems have on oxidant formation the next day as well as how this would effect control requirements predicted from O_3 isopleth control diagrams, research for this project will be focused on:

1. Routine static experiments starting with day old material from various systems for the purpose of comparison with our current data base which does not systematically include day material.
2. A series of experiments to demonstrate the effects of adding various materials thought to partially account for the effects of day old smog, to include injection of O_3 , NO_2 , aldehydes, and various nitrogen-acids.
3. A series of multiday irradiation experiments in which the fraction of "reactive-to-unreactive" hydrocarbons is varied so as to gain insight into the role of "unreactive" components on second day irradiation.

805731

In simulating trace and heavy metal movement through soil, we have quantitatively measured both the broad soil and leachate properties which most influence metal migration rates. The general plan is to match theoretical curves approximately describing metal (As, Be, Cd, Cr, Cu, Pb, Ni, Hg, Se, V, Zn) movement in soil columns under saturated steady state flow conditions with actual data. The patterns for each soil are then correlated with measurable soil-leachate properties. In turn, these parameters can be translated directly into a migration rate of the metals. We are at a position now, of having a predictive program only for cadmium with municipal solid waste leachates under anaerobic condition as will be found under sanitary landfills in humid and subhumid climates. To make results readily available to the layman, we represent the velocities as simple functions of the soil-leachate system properties. The rate of movement of metals through soil can then be easily calculated from a wide range of disposal site situations without use of the sophisticated computer.

805733

The goal of the proposed project is to generate, search out and otherwise obtain, organize and disseminate knowledge which will contribute significantly to an increase in the efficiency of electrostatic precipitators, (ESP). This goal is divided into four objectives, each directed at some aspect of the relationship between electric field, dust particles and current, as affected by the dimensional characteristics of the precipitator.

The first objective is to determine means for improving the data processing capability of the existing circuits in the ESP system of the Control Engineering Laboratory at RTP. The second objective is to improve the voltage and current control systems used in ESP power sources. The third objective is to investigate the extent of improvement of efficiency that might be realized in ESP's by means of dimensional and spatial variations in discharge wires in relation to the position of the given wire array in the sequence of sections. The fourth objective would be the improvement of the AC power configurations used in ESP's.

805739

The studies proposed here are to evaluate the cytogenetic effects of a variety of potentially mutagenic agents presently found in worrisome concentrations in certain human environmental situations. These blood studies, done in parallel with exposure studies conducted by the United States Environmental Protection Agency (EPA) Clinical Studies Division, will focus both upon the determination of mutagenic potential as well as the nature of the cytogenetic damage incurred. We will not be conducting human exposures, but rather be a part of the EPA team using blood from EPA exposed subjects. The initial study proposed calls for 30 subjects to be exposed to 0.4 ppm ozone for 4 hours each of 4 consecutive days; blood samples will be collected prior to and subsequent to each day's exposure and 7 days, 17 days, and 31 days following the initial experimental exposure. Blood samples will be transported to our laboratory, set in culture medium, incubated, microscopic slides prepared and evaluated cytogenetically. Subsequently, modified in vivo ozone exposure experiments will be conducted as well as in vitro exposure experiments involving herbicides 2,4-D and 2,4,5-T and nitrofurans derivatives used as food preservatives.

The main objective of this symposium is to bring together a group of prominent ground water hydrologists capable of synthesizing ground water protection policy which will insure the protection of our ground water resources, whose development is experiencing a dramatic increase in this decade. It is intended that the published transaction of the symposium will serve as a state-of-the-art report on available strategies for dealing with the significant ground water quality issues of our time. The speakers and attendance will represent a broad spectrum of institutions whose needs, activities, products, and interest are impacted by issues and policies, related to ground water protection.

Subject matter to be covered

The symposium will present a series of papers and discussions focused on the following issues relating to ground water pollution.

- A. Ground Water Pollution - An Imminent Disaster or Limited Problem?
- B. Ground Water Quality Standards - Necessary or Irrelevant?
- C. Land Application of Waste - An Important Future Alternative or an Accident Waiting to Happen?
- D. The Federal Ground Water Protection Program - Today's Hope or Tomorrow's Undoing?
- E. State Ground Water Protection Programs - Adequate or Inadequate?
- F. The 208 Planning Approach to Ground Water Protection - A Terrible Joke or a Foot in the Door?
- G. Controlled Degradation and/or Protection Zones - Sense or Nonsense?
- H. Ground Water Models - Practical Tools or Intellectual Toys?
- I. Water Borne Disease - A Current Threat or a Thing of the Past?

It is the purpose of the proposed research to evaluate thirty or more physical and chemical methods for their applicability in analyses of contaminated municipal and industrial leachate streams. This research is necessary since existing analytical methods were primarily developed for analyses of water and waste water and their direct application to leachate analyses was found to lead to erroneous results. The accuracy of the methods will be tested with the standard addition technique, the precision will be evaluated by fifty or more participating laboratories. Analyses of variance will determine the between laboratory and within laboratory error.

805754

The objectives of the project are based on the lack of information concerning the origin of endotoxins (Lipopolysaccharides) in drinking water, their composition and possible health effects. The problems requiring solution are the production, quantitative and qualitative composition of algal endotoxins, as compared with lipopolysaccharides derived from gramnegative bacteria. Another important aspect to be elucidated and studied is the toxicity of different endotoxins and their constituents as related to drinking water supplies and human health.

The approach includes (1) endotoxin isolation from axenic clones of algae and bacteria, (2) algal endotoxin composition as compared with bacterial lipopolysaccharides and (3) toxicity of algal endotoxins as compared with those of bacteria.

The benefits derived from this study will include possible solution to waterborne gastroenteritis of unknown origin which represents a major segment of reported gastrointestinal diseases in the United States. Further, the results of this study will provide better understanding concerning the origin of endotoxins in the environment. On this basis prevention and control of these compounds in drinking water supplies may be developed.

805758

Investigation and application of process automation methods to environmental control processes such as coal cleaning, scrubbers, precipitators, and combustion modification to achieve increased throughput, reduced variance of the controlled process variables, and economic and raw material savings. Subordinate tasks include instrumentation optimization studies which address the performance assurance of sensor data to a known confidence level--an acknowledged problem with data acquisition and process automation. Includes the pursuit of recent knowledge to the solution of these tasks.

805759

Improved procedures for incorporating statistics and economics into the design of regulatory water quality monitoring networks are being developed. The statistical design criterion chosen is to achieve "reasonably" small confidence intervals for the annual mean estimates while maximizing the degree of uniformity in information content supplied by the stations in the network. Since some stations (due to distance from laboratory, access, etc.) are more expensive to sample than others, it is often economically and informationally better to have unequal amounts of information from the stations. A linear programming (LP) formulation of this optimization problem is to be developed and demonstrated. LP is chosen to assist in the practical application of the results.

805771

The principal objective of this project is to critically review the literature on removal and inactivation of viruses in water by chemical coagulation and by pH extremes. A state-of-the-art document will be prepared on the removal and/or inactivation of viruses by these processes.

*NOTE: This is not a new project. It is a continuation of a project which was transferred to Ohio State University, where Dr. Sproul will complete the work he initiated at the University of Maine under EPA Grant R805399.

805772

The primary purpose of this study is to carry out COD determinations on selected synthetic samples containing both volatile and non-volatile compounds using Dewar and Friedrich Condensers for the purpose of attempting to differentiate between the two classes of compounds by direct analyses and/or low temperature vapor traps. From the data obtained in these studies, a revised procedure will be proposed, standardized, and its validity will be tested on real samples and spiked real samples.

The successful completion of this project should give rise to a proposed technique for the systematic and continuous monitoring of water systems which contain both volatile and non-volatile components.

805774

We plan to determine the availability of cadmium by rats from edible plants grown on cadmium enriched soils. Specifically we will measure the absorption and tissue distribution of ^{109}Cd in weanling rats fed semisynthetic diets containing spinach, carrots, lettuce, soybeans, tomatoes and wheat grown on soil treated with $^{109}\text{CdCl}_2$ and compare the relative uptake of metal with that found from similar nonradioactive diets spiked with identical concentrations of $^{109}\text{CdCl}_2$. We will also determine the influence of cooking on the uptake of ^{109}Cd by rats fed a vegetable diet and investigate the distribution and nature of ^{109}Cd binding in the various crops.

805776

"Lake Ballinger Restoration Project"

Restore the lake by construction of sedimentation basins, Hall Creek rehabilitation, Hall Creek hypolimnetic diversion.

805777

The objective is to produce a preliminary evaluation of hyperfiltration as a technology for separating toxic substances found in textile process water.

Hyperfiltration of discharges from two textile processes, scouring and dyeing, will be accomplished using three types of membranes. The performance characteristics of the membranes and the toxicity and chemical analyses of all feeds, concentrates, and permeates will provide the data for the evaluation.

805784

"The Tioga River Demonstration Project"

The project is intended to demonstrate the abatement of deep mine drainage by restoring strip mines located above and infiltrating water into the underground mines. It is intended to demonstrate deep mine drainage abatement by monitoring deep mine discharges before and after restoration of associated strip mines.

805788

This project proposes to measure (and collect from others) background visibility data necessary for (1) the setting of visibility standards and (2) the validation of operational models. The measurement program relies on a recently developed instrument, the multiwavelength contrast photometer. Calculations and measurements indicate that while multiwavelength contrast measurements in the blue portion of the visible spectrum are primarily sensitive to aerosol within the mixing layer, contrast measurements in the red portion of the spectrum are sensitive to aerosol above the mixing layer. The relationship between wavelength dependence on contrast measurements to vertical aerosol distributions is quite dependent on observation angle. Since contrast measurements are related to both tropospheric and stratospheric aerosol concentrations, the instrument is well suited to measure/monitor contrast changes due to spatial variations in aerosol concentrations that take place over hundreds of kilometers. Subject contrast is directly related to visibility and consequently the contrast telephotometer is also a direct measure of visibility as a function of spatially varying aerosol loads.

Scope: The envisioned project is divided into three separate phases. The first phase deals with detailed site inspections, low level flow monitoring efforts and detailed computer modeling to ascertain typical runoff flows for the design and construction phase. In the second phase of work, a swirl and helical bend regulator will be designed, fabricated and installed near the outlet of a separate storm sewered urbanized area. The flow at the outlet will be divided and inputted into a swirl and a helical bend regulator constructed side by side. In the third phase of work, the two treatment units will be monitored during a 6 month period for approximately 15 separate storm events, covering a wide range of antecedent dry conditions, rainfall intensity and duration. A comparative assessment of the two units will be made from these results. It is envisioned that the project duration would be 18 months permitting submission of the final report three months prior to the contract deadline.

Objectives: The objectives of the proposed project are as follows:

- (1) Design, construct, & install a swirl and helical bend regulator to operate on storm sewer discharges from a residential area for a 6 month period (~ 15 storm events).
- (2) Test the operational pollutant reduction performance of a swirl & helical bend regulator on a storm drainage discharge from a 100 acre residential area.
- (3) Assess the hydraulic influent and effluent/foul sewer waste stream characteristics for various meteorological events of the two treatment devices.
- (4) Assess the influent, effluent and foul stream characteristics from both devices with respect to BOD, COD, nitrogen, and phosphorus, solids, several metals and bacteria.
- (5) Test the feasibility of foul sewer discharge to an adjacent sanitary sewer for removal of waste stream effluents over an extended period.
- (6) Assess the particle distribution of the foul sewer discharge with respect to grit, sand, and organics.

The primary objective of this project is to provide a complete characterization of certain ecologically important phytoplankton populations occurring in the Laurentian Great Lakes. The main topics which will be addressed include:

1. The range in size and morphological plasticity of quantitatively important phytoplankton populations occurring in the Laurentian Great Lakes.
2. The presently documented distribution of these populations within the Great Lakes system.
3. Quantitative analysis of external form and internal cellular constituents and modifications which occur during the organisms normal life cycle.
4. The specific effects of external environmental factors in modifying cellular morphology.

The work is designed to support both classical population distribution based water quality assessment and the development of more realistic multiple physiological compartment models of phytoplankton dynamics.

The problem will be approached primarily through the application of quantitative light and electron microscopy (stereology) of both naturally occurring populations and populations exposed to controlled environmental perturbation.

This study will provide policy makers with a more complete understanding of how scrap markets function, that is what determines supply and demand for scrap materials. There are four major objectives of the study. (1) To update and extend previous econometric studies of scrap material demand and supply. (2) To assess the feasibility and desirability of cross sectional econometric models across countries to obtain long-run supply and demand parameters for scrap materials. (3) A study of the feasibility of a cost analysis of scrap material generators to infer the long-run supply curve for scrap materials. (4) To study the costs of obtaining data on scrap dealer inventories and costs of capital.

The information provided by this study should aid policy makers in: (1) determining how new legislative initiatives should be designed, (2) determining how existing statutes should be implemented, and (3) defining the correct parameters which should be used to monitor the performance of statutes once they have been implemented.

The Strategic Environmental Assessment System (SEAS) Model has been developed by the U.S. Environmental Protection Agency to improve our knowledge of the impacts of environmental issues and policies on the national and regional economies and environmental quality. Over the last few years, the SEAS Model, developed as a system of interrelated economic-environmental models (or modules) has been used effectively in a variety of policy contexts - assessing the economic and environmental consequences of U.S. population growth, national and regional energy development programs and clean air and transportation energy conservation programs.

However, current knowledge of the structure of SEAS and its many policy applications can be obtained only from "fugitive" documents, not easily accessible to the broader academic and policy community. The purpose of the work proposed here is to prepare a book that will bring together a) a review of the theoretical and policy context of SEAS; b) a technical description of the SEAS Model; and c) a set of examples of policy application of SEAS.

Professor T.R. Lakshmanan, the principal investigator, will write Part I, which will provide a survey of the theoretical context and a technical description of the SEAS Model. He will also edit Part II, which will cover four or five major policy applications as reported by different individuals from the U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Commerce and Resources for the Future, who developed these policy applications.

805803

The specific objective of this project will be to compile and issue for publication quarterly bibliographic reports containing information on oil pollution. Included will be summaries of (a) oil spill events (b) bibliographic literature citations, (c) current research projects and (d) patent summaries.

Compilation of an annual compendium on oil spill products and equipment will serve as a complete reference source for researchers, planners, government personnel, and manufacturers involved in pollution prevention and control. This compendium will be a new supplement to the oil pollution information program.

Prior awards of grants R803063, R803992 and R805052 since 1974 have resulted in the publication of thirteen (13) quarterly issues of "Oil Spill and Oil Pollution Reports".

805811

1. Objectives: Definition of "Best Management Practices" for pollution control in Irrigated agriculture requires that the individual factors contributing to the return flow quality be identified. At present, the most difficult segment of an irrigation return flow system to delineate is the on-farm water use and efficiency characteristics. Existing techniques are too expensive for general planning utilization. The principal objective of this research is to develop and verify a field evaluation procedure for planners attempting to delineate the on-farm factors affecting irrigation return flows.

2. Approach: Utilizing existing field data and some collected at three locations in Colorado, a furrow irrigation efficiency model will be developed and tested. Model reliability and accuracy will be defined with field observations and comparisons with more complex furrow models expected to be available in the near future. Field data collection procedures will involve initial testing to calibrate the simulation parameters and a subsequent test of the predictive capability under altered and more efficient water management practices. The results of the project will be a technical report, field planning manual, and a prototype slide-rule calculation design.

805813

The objective of this effort is to develop and implement a source separation option for The Waste Resources Allocation Program (WRAP) model to guide decision makers who are examining alternative regional solid waste management strategies. The approach to this project will be to:

- To modify the input data structure of the WRAP model in order to simulate source separation of municipal solid waste.
- To test and verify modifications of the model utilizing real field data from one city and regional configurations.
- To evaluate various source separation techniques with the modified model and compare source separation techniques.
- Prepare a concise documentation of the modifications to be utilized as a user's guide which will supplement existing WRAP publications.

Work will begin in January 1977 and be completed within six months.

805826

The objectives of this project are to develop a nutrient budget and a nutrient flow model for a typical freshwater prairie glacial (pothole) marsh receiving agricultural runoff as its major input of water. This model will be useful in: (1) determining the efficiency of this and similar marshes at removing nitrogen and phosphorus from non-point sources of agricultural runoff, and (b) developing installation and management guidelines for marshes used as nutrient sinks for non-point sources of agricultural runoff.

Field work will be carried out at Eagle Lake, a typical prairie glacial marsh, in Hancock County, Iowa. Water, plant, and soil samples will be collected at frequent and regular intervals during the spring, summer, and fall. These samples will be analyzed for total nitrogen, phosphorus, and carbon. This project will be part of an ongoing study of production, decomposition, and nutrient cycling in prairie glacial marshes. This study has been under way at Eagle Lake since 1974

A short distance south of Sapelo Island, Georgia, the numerous channels of the Altamaha River terminate at the sea. Although there have been a few studies of this freshwater to brackish water wetland system, processes within these wetlands and their relationship to the more intensively studied saline zones are poorly understood. Since October, 1976, several investigators at the University of Georgia Marine Institute, Sapelo Island, have been conducting studies which focus on the detrital and microfloral processes in three types of wetlands (swamp, natural freshwater marshes and brackish water marshes) and examine some of their relationships to the saline wetlands which have been studied for more than two decades by researchers based at the University of Georgia Marine Institute on Sapelo Island. Data on potential detritus production, rates of detrital decay, and transport of detritus indicate a need for further studies in these areas before a quantitative assessment can be made concerning the interaction of the freshwater, brackish water and saline systems. We propose to continue our studies on detrital dynamics through February 1979, thus providing us with more than two years of data for these systems. In the proposed study we will continue to monitor detrital productivity and conduct more intensive work on detrital decay rates. The completion of this proposed work will enable us to compare the processes in the several systems. We will then be in a better position to predict if impacts on one system are likely to produce similar or different effects on processes in the other types of systems.

Objectives:

1. Refine current methodologies and estimate the economic value of lake restoration to recreationists engaged in various water-oriented activities.
2. Estimate the economic impact of lake restoration to adjacent property owners.
3. Identify and evaluate costs of lake restoration.

Approach:

A sample of recreationists will be drawn at public access points. Answers from the questionnaire will be used to estimate the demand for recreation. Estimates of value to recreationists using the lake will be derived.

A sample of residents will be drawn to estimate the impact of improved water quality on property values. Actual sales and perceptions of owners will be used.

Costs of cleaning a lake and alterations required to maintain increased quality will be outlined and estimated.

805864

The objectives of this proposed project are to review available methodologies and to develop and evaluate instrumentation which will enhance existing capabilities for quantitative detection of viable microorganisms in ambient air.

The proposed work will be accomplished in three distinct phases. Premature selection of an arbitrary ambient viable microbial air sampler design has been avoided in this proposal. Instead, this selection will be performed in phase I, after review of existing designs and development of alternatives which are most compatible with the objectives of this project. These objectives will be met by a new design or by modification of existing instrumentation. Based upon the design selected, plans will be drawn and a prototype sampler will be constructed in phase II. In phase III this prototype instrument will be evaluated, utilizing microbial aerosols, to determine its collection efficiency, collected organism viability maintenance, sensitivity, and, if applicable to the final design, particle size discrimination.

805868

ASCE has established a voluntary Subcommittee on Oxygen Transfer to develop a tentative standard for the evaluation of oxygen transfer equipment in water and wastewater. Through the utilization of workshops, internal discussions, and selected laboratory research studies, the Subcommittee will comprehensively assess the major factors affecting and the areas of agreement and disagreement in evaluating oxygen transfer. Well-known experts in the field will be retained by ASCE as part of the grant project to review the output of these activities, condense the work of the Subcommittee into a draft tentative standard, and recommend procedures for verification of the tentative standard which if carried out and data incorporated would result in a consensus standard. The draft standard will be thoroughly critiqued by the Subcommittee prior to finalization of the EPA report and presentation of the tentative standard to the Society.

805947

The development and application of identification and detection technology is proposed for evaluating the genetics of baculoviruses pesticides for recombination and mutation. This is being accomplished by use of restriction endonuclease fragment analysis, SDS-polyacrylamide gel electrophoresis and radioimmunoassay. With such techniques the ability to identify and monitor for baculovirus-host interaction and potential to undergo genetic change can be accomplished.